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Scoping and Planning Technical Memorandum

PROTECO Superfund Site
Remedial Investigation/Feasibility Study
Peñuelas, Puerto Rico

Prepared for:

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LIST OF ACRONYMS AND ABBREVIATIONS

‰	Parts per Thousand
ACD	Amended Consent Decree
AOC	Administrative Settlement Agreement and Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Above-ground Storage Tank
Brosval	Brosval Chemical, Inc.
CAMU	Corrective Action Management Unit
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	Conceptual Site Model
DBA	Doing Business As
DCA	Dichloroethane
DCE	Dichloroethene
DEM	Digital Elevation Model
EP Tox	Extraction Procedure Toxicity
ft BLS	Feet Below Land Surface
Ganadera	Compañía Ganadera del Sur, Inc.
Geosyntec	Geosyntec Consultants, Inc.
HDPE	High Density Polyethylene
HWMU	Hazardous Waste Management Unit
HRS	Hazard Ranking System
IPaC	Information for Planning and Consultation
MCL	Maximum Contaminant Level
MSL	Mean Sea Level
NAD83	North American Datum of 1983
NCP	National Contingency Plan
NPL	National Priorities List
OHM	OHM Remediation Services Corp.

PCB	Polychlorinated biphenyls
PCE	Tetrachloroethene
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREPA	Puerto Rico Electric Power Authority
PREQB	Puerto Rico Environmental Quality Board
PROTECO	Protección Técnica Ecológica, Inc.
PRVD02	Puerto Rico Vertical Datum of 2002
PVL	Peñuelas Valley Landfill, Inc.
RAO	Remedial Action Objective
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI/FS	Remedial Investigation/Feasibility Study
RMS	Removal Management Levels
RSL	Regional Screening Level
RWE	Right Way Environmental Contractors, Inc.
SCI	Servicios Carbareón, Inc.
SMCL	Secondary Maximum Contaminant Level
SOW	Statement of Work
SPTM	Scoping and Planning Technical Memorandum
SQG	Small Quantity Generator
SVOC	Semi-volatile Organic Compound
TBC	To Be Considered
TCE	Trichloroethene
TDS	Total Dissolved Solids
T&E	Threatened or Endangered
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TSDF	Treatment, Storage, and Disposal Facility
USEPA	United States Environmental Protection Agency

USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

This Scoping and Planning Technical Memorandum (SPTM) was prepared by Geosyntec Consultants, Inc. (Geosyntec) for the PROTECO Superfund Site ("Site") on behalf of the PROTECO Landfill Superfund Site Generators Parties Group (the "Group"), pursuant to Paragraph 34(a) of the Administrative Settlement Agreement and Order on Consent (AOC) for Remedial Investigation/Feasibility Study (RI/FS) and Section II, Task 1(A), of the Statement of Work (SOW) attached to the AOC as Appendix C.

The Site is located in the Tallaboa Ward of the Municipality of Peñuelas, Puerto Rico and consists of a former treatment, storage, and disposal facility (TSDF) for hazardous and nonhazardous wastes. The facility conducted waste management activities from approximately 1975 until 1999. It was operated by Servicios Carbareón, Inc. (SCI) between 1975 and 1985, at which time the company name was changed to Protección Técnica Ecológica (PROTECO). The name was subsequently changed to Resources Management, Inc. doing business as PROTECO.

In 1976, the Puerto Rico Environmental Quality Board (PREQB) issued a temporary permit to SCI to dispose of polyethylene wastes in an approximately 1-acre surficial area. Thereafter, the TSDF expanded its disposal areas and managed a variety of Resource Conservation and Recovery Act (RCRA) hazardous and non-hazardous wastes in both surficial and subsurficial areas. Types of waste that the facility received included but were not limited to spent halogenated solvents, lead, chromium, electroplating sludge, wastewater treatment plant sludge, slurries, petroleum wastes, pesticide wastes, and pharmaceutical and manufacturing wastes.

Throughout the facility's operational history, hazardous and non-hazardous wastes were stored, treated and/or disposed in seventeen (17) waste units, which generally consisted of landfills, impoundments and lagoons, drum and tank storage areas, and land treatment areas. The waste units were underlain by native carbonaceous silt and clay and were reportedly not constructed with liner systems or leachate collection systems. Many waste units were eventually capped with a clay and soil cover system as part of the required RCRA closure activities between 1997 and 1999. Based on Geosyntec's review of currently available documents, limited post-closure care activities were conducted following closure of the waste units. The Site was reportedly abandoned by the facility operators sometime between 2001 and 2009.

Inspection activities, conducted by representatives from the United States Environmental Protection Agency (USEPA), PREQB, and the Puerto Rico Department of Natural and Environmental Resources (PRDNER) beginning in 1980, found hazardous waste management and groundwater monitoring practices at the facility inadequate and out of compliance with Commonwealth and Federal regulations. The investigations also reportedly identified evidence of contaminants within groundwater. In May 2019, the Site was issued a hazard ranking system (HRS) scoring of 36.33 and placed on the National Priorities List (NPL) based on USEPA's

assessment of the groundwater migration pathway.[1] On October 6, 2020, the Group entered into the AOC with USEPA. The AOC requires the performance of an RI/FS by the Group to investigate the nature and extent of contamination at the Site and to evaluate potential remedial alternatives.

The SPTM presents a summary of available Site background information to support RI/FS planning, including a history of Site operations, closure, regulatory actions, and response actions, a description of the physical setting of the Site, an evaluation of the location and extents of former waste units, a general summary of historical analytical data, and a preliminary conceptual site model (CSM). A preliminary Site boundary was also established to define an initial area for the RI.

The SPTM also identifies preliminary data gaps at the Site and general proposed activities that may be conducted during the RI to address the data gaps. Specific details regarding the approach for further investigation activities will be provided in forthcoming documents (e.g., the RI Work Plan).

Additionally, the SPTM describes preliminary remedial action objectives (RAOs), potential general response actions, and potentially applicable, relevant, and appropriate requirements (ARARs). The RAOs, general response actions, and ARARs may be refined based on additional data collection and evaluation during the RI. The final RAOs for the Site will be established during the RI/FS.

[1] Contaminant migration pathways that may be evaluated by USEPA during HRS evaluation include the groundwater migration pathway, surface water migration pathway, soil exposure and subsurface intrusion pathway, and air migration pathway. According to the *HRS Report*, the groundwater migration pathway was evaluated at the Site since this pathway produced an overall score above the minimum requirement for the Site to quality for inclusion on the NPL (Weston, 2019).

1. INTRODUCTION

This RI/FS SPTM has been prepared for the U.S. Environmental Protection Agency (USEPA) for the PROTECO Superfund Site ("PROTECO Site" or "Site"), USEPA ID No. PRD000831487.[2] The SPTM was prepared by Geosyntec Consultants, Inc. (Geosyntec) on behalf of the Proteco Landfill Superfund Site Generator Parties Group (Group) and in accordance with Task 1 *RI/FS Scoping and Planning* from the USEPA Statement of Work (SOW) established in the Administrative Settlement Agreement and Order on Consent ("AOC" or "Settlement"; **Attachment A**), executed by the Group and USEPA on October 6, 2020.

1.1 Purpose

The SPTM is a pre-RI/FS planning document that presents information required to plan and execute the RI/FS. The purpose of the SPTM is to present:

- a summary of available Site background information including Site operational, closure, regulatory, and response action history, analytical data, and a preliminary conceptual site model (CSM);[3]
- a definition of the initial area for the RI through establishment of a preliminary Site boundary; and
- a preliminary and general definition of the scope of the RI/FS, preliminary potential RAOs and general response actions, and preliminary potential applicable or relevant and appropriate requirements (ARARs) to guide the development of the technical approach for meeting regulatory requirements.

The objective of the RI/FS process is to investigate the nature and extent of contamination and evaluate potential remedial alternatives pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the National Contingency Plan (NCP). Specifically, the RI/FS seeks to gather information sufficient to support an informed risk management decision regarding remedial alternatives (USEPA, 1988).

USEPA guidance documents *Guidance Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (1988) and *Getting Ready, Scoping the RI/FS* (1989) were reviewed and referenced during development of the SPTM.

[2] The Site refers to the area of land historically operated as the PROTECO landfill including during its operation by predecessor or successor entities. The Site boundary is discussed further in Section 5.

[3] SPTM preparation is based on review of records within the *Hazard Ranking System (HRS) Documentation Record,* also referred to herein as the *HRS Report* (Weston, 2019); documents received after January 1, 2021 are not incorporated but may be included in the subsequent RI Work Plan, as necessary.

1.2 SPTM Organization

The SPTM is organized as follows:

- *Section 2 – Site Location and History* - a summary of the Site location, features, historical operations, ownership and parcel identification, and a history of regulatory and response actions at the Site.
- *Section 3 – Physical Setting* - a summary of Site topography, hydrology, land use, geology, hydrogeology, and vicinity groundwater use.
- *Section 4 – Evaluation of Existing Data* - a summary of waste unit locations and extents, known substances disposed at the Site, closure-related activities for disposal units, historical sampling, and available historical analytical data. This section also includes initial identification of data gaps and general proposed activities to address data gaps.
- *Section 5 – Preliminary Site Boundary and Site Security* - a summary of the preliminary Site boundary and Site security measures.
- *Section 6 – Preliminary Conceptual Site Model* – a preliminary understanding of the CSM, including the sources of contamination, potential release mechanisms, potential routes of migration, and potential human and environmental receptors.
- *Section 7 – Preliminary Remedial Action Objectives* - preliminary Remedial Action Objectives (RAOs), preliminary general response actions, and associated technologies.
- Section 8 – Potential Applicable, Relevant and Appropriate Requirements - potential ARARs.
- *Section 9 – References* - references relied upon during preparation of the SPTM.

2. SITE LOCATION AND HISTORY

Between approximately 1975 through 1999, the Site operated as a treatment, storage, and disposal facility (TSDF) accepting a variety of hazardous and non-hazardous waste from various sources. Details of the types of waste accepted in various waste management units at the Site are discussed in **Section 2.4**. The Site ceased operations around 1999. Between 2001 and 2009, limited closure and post-closure activities were conducted at the Site before the Site was abandoned and became overgrown with vegetation (Weston, 2019).

2.1 Site Location

The PROTECO Superfund Site is located at PR Road 385, Kilometer (Km) 4.4, Barrio Tallaboa, Peñuelas, Puerto Rico within the Rio Tallaboa valley (**Figure 1**). The Site acreage was reported as approximately thirty-five (35) acres in the *Hazard Ranking System (HRS) Report* (Weston, 2019). Further analysis of historic documents and recent survey data collected by Geosyntec indicate the area of the historic PROTECO Site operations exceeded 35 acres. The Site boundary and acreage is discussed further in **Section 5**.

The Site is bordered to the west by the Peñuelas Valley Landfill, Inc. (PVL) and to the east/southeast by the Ecosystems Landfill, which are reportedly operated as Resource Conservation and Recovery Act (RCRA) Subtitle D non-hazardous industrial waste landfills (**Figure 2**). PVL is currently operated by EC Waste on an approximate 140-acre area leased from Compañía Ganadera del Sur, Inc. (Ganadera). Historical information suggests that PVL was previously operated by Waste Management from approximately 1996 through 2014. Ecosystems, Inc. reportedly owns the approximately 100-acre facility east of the PROTECO Site and has operated it since 2014.

The Site is bordered to the north and south by undeveloped, vegetated land. The closest residential communities are the Seboruco and Tallaboa communities, located approximately 1.5 miles west and south-southwest of the Site, respectively.

2.2 Site Ownership and Parcel Identification

Limited ownership and title records exist for the Site. A title study report dated August 15, 2014, indicates the Site is located within a 42-acre property currently owned by Brosval Chemical, Inc. (Brosval) (**Attachment B**). Brosval is a corporation represented by its president, Mr. Lucas Perez Valdivieso Torruella.[4] Brosval reportedly purchased the property in 1996 from Ganadera, a private corporation owned by Jorge Valdivieso and Lucas Valdivieso. According to the 2014 title study, the 42-acre property consists of two adjoining parcels: Parcel A (south parcel) which includes approximately nine (9) acres and is described as "land with shrubs and weeds" and Parcel B (north

[4] The acquisition of the 42-acre property by Brosval is documented on a purchase agreement dated October 11, 1996 (**Attachment B**).

parcel) which includes approximately thirty-three (33) acres and is dedicated to the "treatment and disposal of waste."

The documents reviewed indicate that both parcels are bound to the north, west, and south by properties owned by Ganadera and by Jorge and Lucas Valdivieso. As indicated in the 2014 title study, the property was registered under Brosval Chemical, Inc. in the Puerto Rico Registry of the Property under page 44, volume 198 of Peñuelas," property number 2,202, inscription 13a.

A certified plat study or registered survey plans for the Site and/or property boundary could not be obtained. Previous communications with the property owner's representative indicate that past lease agreements with entities operating the PROTECO Site did not include a demarcation of property boundaries or operational areas. Additional attempts to locate information regarding historic parcel and operational Site boundary, including review of records available from government agencies did not yield additional information.[5] The Site boundary is further discussed in **Section 5**.

2.3 Site Features

Site features shown on **Figure 2** are based on the 2005 *Site Reassessment Letter* (Commonwealth of Puerto Rico, 2005), Site Reconnaissance Visits conducted in June 2017 by USEPA and Weston (Weston, 2019), Geosyntec Site visits in November 2020 and April 2021, and the Site Reconnaissance Visit conducted by USEPA and the Group on May 3, 2022.

The PROTECO-controlled fenced area is currently abandoned and was overgrown with heavy vegetation until Geosyntec conducted vegetation clearing activities between February and April, 2022.[6] Current features include an unpaved access road, barbed wire fences and access gates, capped disposal units, landfill gas vents, abandoned waste management and treatment infrastructure, and four steel above-ground storage tanks (ASTs).

An area in the west-central portion of the Site near the western access gate has been reportedly used as an illegal cattle pen for more than eight (8) years and wooden corrals are present where trespassers have kept and maintained livestock. Some animals are still located at the Site. Additionally, abandoned equipment (refrigerators) are present in this area.

Capped disposal units are shown on **Figure 3**.[7] Additional Site features include an abandoned leachate sump pump and approximately ten (10) monitoring wells within and around the Site's

[5] Records reviews were conducted by Puerto Rico licensed surveyor Richard Chang through the KARIBE Puerto Rico Property Register website on June 1, 2021 and through an in person visit to the Puerto Rico Property Registry Regional Office in Ponce, Puerto Rico on June 7, 2021.
[6] The PROTECO-controlled fenced area refers to the fenced area at the approximate location of or within a portion of the former PROTECO landfill site. Refer to Section 5 for additional definition of the Site boundary.
[7] Portions of Waste Units 4 and 6 are depicted on Figure 3 as outside of the PROTECO-controlled fenced area. Section 4.1 provides further details regarding waste units' locations and areal extents.

fenced area that are currently damaged, abandoned, and/or in disrepair. Individual landfill gas vents and damaged monitoring wells are not shown on the figures**.**

Additional features in the vicinity of the Site and outside of the PROTECO-controlled area include the former PROTECO office and two stormwater control/sedimentation ponds to the south, the EC Waste leachate collection pond and maintenance building to the west, and additional buildings, waste disposal cells, and access roads on PVL.[8]

2.4 Historical Operations

A review of historical records indicates that prior to 1975, the Site and surrounding properties were undeveloped. The Site was operated by Servicios Carbareón, Inc. (SCI) between 1975 and 1985, at which time the company name was changed to "Protección Técnica Ecológica, Inc." (PROTECO). Between approximately 1988 and 1989, the name was changed again to Resource Management, Inc. doing business as (DBA) PROTECO. The former TSDF accepted a variety of hazardous and non-hazardous waste (Commonwealth of Puerto Rico, 2005).

A summary of historical operational areas and current features at the Site is shown n **Figure 3**. This figure includes geo-referenced locations of former access roads and waste disposal units at the Site based on Geosyntec's analysis of historical aerial images and maps from previous reports (**Section 4.1**).

Table 1 and **Figure 4** present detailed summaries of operational years and descriptions of the seventeen (17) waste management units at the Site, which are listed below. The summaries include the types and reported approximate volumes of waste deposited or stored within each unit, approximate operational years, and historical operational methods/observations, where known. Waste units were underlain by native silt and clay as described in **Section 3.4** and were reportedly not constructed with liner systems or leachate collection systems (Weston, 2019).

Waste Unit Number	Waste Unit Type
1, 2, 3, 5, and 8	Drum burial landfills
4	Above-ground drum and container storage area
6	Surface (sanitary) landfill
7 and 17	Neutralization impoundments
9	Oil lagoon
10, 11, 16	Immobilization facilities
12 and 14	Land treatment areas
13	Rainwater lagoon
15	Above-ground storage tank area

[8] The existing sedimentation ponds were designed and constructed as stormwater control features as presented in the *Hazardous Waste Management Unit Post-Closure Care Permit Application* (Law Environmental – Caribe, 1999a).

According to the *Closure and Post Closure Plan for Waste Units 1, 2, 3, 5, 7, 9, 10, 11, 12, 13, 16, and 17* ("*Closure and Post Closure Plan"*) prepared by OHM Remediation Services Corp. (OHM, 1996a), "records of waste placement are not available for the waste units" and therefore the boundaries and extents of waste units reported therein and in other documents were based on geophysical studies, aerial photography, employee interviews, site inspections, and historical test pits. Waste unit extents depicted on SPTM figures have been modified from those presented in the *HRS Report* based on information from various sources as discussed in **Section 4.1.**

In the *RCRA Facility Assessment (RFA) Preliminary Review*, USEPA reports that fourteen (14) of the Site's 17 waste units were used for hazardous waste disposal and the remaining three waste units (Waste Units 6, 8, and 14) were designed for non-hazardous material use (1986a). Waste accepted at the facility reportedly included electroplating sludge, wastewater treatment plant sludge, slurries, petroleum waste, pesticide waste, and pharmaceutical and manufacturing waste (Weston, 2019). Hazardous waste included metals, ignitable and corrosive substances, halogenated and non-halogenated solvents and hydrocarbons, and pesticides.

Hazardous waste was reportedly accepted at the Site until 1990 and non-hazardous waste was accepted until 1999 (Commonwealth of Puerto Rico, 2005). Following the cessation of hazardous waste management at the Site, Waste Unit 14 was reported as being used as the primary waste management unit. Liquid waste was disposed in excavations in Waste Unit 14 along the edges of hills to the east and south of the unit and allowed to evaporate. The remaining solids were mixed into underlying and adjacent soils and covered (CDM Federal Programs Corporation [CDM], 1992).

Historical records suggest that non-hazardous Waste Units 6, 8, and 14 contained some amount of hazardous material during the Site's operational period (**Table 1**). Specifically, a 1983 compliance inspection report states that hazardous waste, including solvents, alcohol, freons, mercury, and chromium, was managed prior to 1983 in a land application area inferred to be Waste Unit 14 based on information and maps included in the report (Ertec, 1983). Additionally, non-hazardous landfill Waste Unit 6 is noted in the *RFA Preliminary Review* (USEPA, 1986a) and a closure plan document (Fred C. Hart, 1986) as having received Small Quantity Generator (SQG) waste with hazardous constituents. Similarly, Waste Unit 8 was reportedly operated as a drum burial area for corrosive hazardous waste (waste code D0002) (Commonwealth of Puerto Rico, 2005).

When drums or containers of waste were received at the Site, material was reported to have been either emptied into various surface units, or the containers were stored aboveground or buried in landfills without emptying the container contents (Commonwealth of Puerto Rico, 2005). Liquid and oily waste (heavy oils and tar) was deposited in the oil lagoon (Waste Unit 9). Runoff water and non-hazardous water were pumped from the oil lagoon to maintain freeboard and stored in the rainwater lagoon (Commonwealth of Puerto Rico, 2005 and USEPA, 1986a). Non-hazardous sludge from the oil lagoon was land farmed on-Site and hazardous sludge was immobilized and disposed off-Site. Both liquid and sludge/solid waste was applied to surface soils in land treatment units (Waste Units 12 and 14) for native biodegradation of waste. Based on a USEPA report (1986a), there had been no demonstration that biodegradation was occurring-on Site.

Additional waste treatment processes used by the facility included pH neutralization, which consisted of mixing the received material with either acidic or alkaline additives, and a stabilization and fixation treatment process, which consisted of mixing liquid waste with lime, ash, cement, and/or kiln dust to solidify the material (Commonwealth of Puerto Rico, 2005).

2.5 Historical Regulatory and Response Actions

In 1976, the PREQB (presently the PRDNER) issued an interim, temporary permit to SCI to dispose polyethylene waste over a 1-acre surface area. PROTECO reportedly managed hazardous waste and non-hazardous waste within various areas of the Site beginning in 1975, exceeding the temporarily-permitted 1-acre area and including both surface and subsurface areas (USEPA, 1986a; Commonwealth of Puerto Rico, 2005).

Following enactment of the RCRA in 1980, SCI, and later PROTECO, operated under an interim status condition (i.e., prior to obtaining the required hazardous waste TSDF operating permit required by RCRA Subtitle C) while the Part B application was being reviewed. During the interim status period, the facility was required to operate (self-implement) in compliance with interim status standards of 40 Code of Federal Regulations (CFR) 265 (USEPA, 2005). The application was ultimately rejected due to violations.

Inspections were conducted between 1980 and 1987 by representatives from the USEPA, PREQB, and PRDNER, and included a 1985 USEPA Groundwater Task Force inspection. The reviews indicated that the hazardous waste management program and groundwater monitoring program established by SCI/PROTECO were inadequate and were not in compliance with Commonwealth and Federal regulations. The observations noted in the reviews included lack of runoff control, unlined waste units, corroded and leaking drums over exposed soil, and improper drum labeling (Commonwealth of Puerto Rico, 2005). An Administrative Order on Consent executed in 1985 established requirements for PROTECO to conduct investigations into the nature and extent of any substantial hazard to human health or the environment as a result of facility operations (USEPA, 1985).

In October 1987, a Consent Decree between USEPA, PROTECO, and Ganadera (the property owner of the PROTECO-leased facility) was executed, stipulating that PROTECO and Ganadera would be subject to injunctive relief for RCRA violations. In 1991, PREQB referred the Site to the USEPA RCRA Program based on potential hazards to the environment and human health resulting from contaminated soils, groundwater, and run-off water at the rainwater lagoon. A 1992 *Updated RFA Draft* report stated that certain waste units were continuing operation without engineering controls and there was possible evidence of the migration of contaminants within groundwater (Commonwealth of Puerto Rico, 2005). By this time, the facility's hazardous waste TSDF operating permit Part B permit application had been rejected by USEPA and the facility's ability to operate hazardous waste units under Interim Status had been lost. Therefore, only non-hazardous waste management was reported to be occurring, primarily within Waste Unit 14, and PROTECO was reported to be in the process of conducting closure activities for hazardous waste units (CDM, 1992).

In September 1996, PROTECO submitted plans for closure of hazardous waste units at the Site. Plans were approved by USEPA in September 1997. In November 1997, an Amended Consent Decree (ACD) was executed, requiring PROTECO to comply with RCRA requirements for closure and post-closure care of the hazardous waste units, including executing the approved closure plans under USEPA oversight and completing post-closure permitting, maintenance (e.g., runoff and runoff controls), groundwater monitoring, and reporting (USA v. PROTECO and Ganadera, 1997).

Between November 1997 and February 1999, PROTECO conducted waste unit closure activities as detailed in **Section 4.2** (Weston, 2019). PROTECO conducted additional RCRA post-closure maintenance activities, however, post-closure care ceased sometime between 2001 and 2009, and the Site was abandoned by the PROTECO operators. While PROTECO submitted a Post Closure Care Permit application, a Post Closure Permit was never issued for the Site (USEPA, 2017). Similarly, while Resources Management, Inc. DBA PROTECO submitted a Closure Certification Document (Law Environmental – Caribe, 1999B) documenting the completion of closure activities and USEPA issued a response letter finding the document to be adequate and requesting a revision to a few "minor deficiencies" (USEPA, 1999), a final Site closure approval was not issued by USEPA since post-closure care requirements were not completed.

No maintenance of the landfill surfaces, capped waste units, or run-on/run-off control features appear to have been conducted following abandonment of the Site. Similarly, no post-closure groundwater monitoring was conducted, no leachate was removed from the Corrective Action Management Unit (CAMU, described in **Section 4.3**), and the Site eventually became overgrown with vegetation. No groundwater monitoring program currently exists for the Site (Weston, 2019).

In November 2017, the USEPA's Caribbean Environmental Protection Division referred the Site from the RCRA program to the CERCLA program for evaluation of potential releases. A Site HRS score of 36.33 was calculated in the 2019 *HRS Report* based on the groundwater migration pathway. The surface water, soil, subsurface intrusion, and air migration pathways were not scored "*because the ground water migration pathway produces an overall score above the minimum requirement for the PROTECO Site to qualify for inclusion on the National Priorities List (NPL)*" (Weston, 2019). The Site is now managed under the USEPA CERCLA program.

A more detailed regulatory history is presented in the *RFA Preliminary Review* (USEPA, 1986a), *Updated RFA Draft* (CDM, 1992), *Site Reassessment Letter* (Commonwealth of Puerto Rico, 2005), and referral memorandum from RCRA to CERCLA (USEPA, 2017).

3. PHYSICAL SETTING

3.1 Topography and Surface Hydrology

The PROTECO Site is located on the southern flank of the Cordillera Central mountain range that crosses Puerto Rico from east to west. The Site is located on the eastern side of an entrenched drainage basin which includes the west adjoining PVL and surrounding areas of undeveloped land to the northeast, north, and south. To the southwest of the Site, a northeast-southwest trending unpaved road between PR Road 385, the Site, and EC Waste Landfill follows the main drainage valley floor and provides access to the existing landfill facilities. According to the United States Geological Survey's (USGS) topographic map for the Site, elevations along the western portion of the Site are approximately 280 to 400 ft above mean sea level (ft msl), and elevations in the eastern portion of the Site are approximately 500 ft msl (**Figure 5**).

Surface water runoff originates within the northern portions of the drainage basin encompassing PROTECO and PVL and is reported to leave the Site through a drainage ditch that discharges into a sedimentation pond just to the south of the main PROTECO and PVL entrance. This ditch extends south toward the lower Tallaboa River valley roughly alongside the access road leading to PR Road No. 2. Surface water in the ditch does not join the Tallaboa River but rather enters the Tallaboa Bay less than one (1) mile east of the Tallaboa River (USEPA, 1986a). Runoff is reported to occur rapidly following periods of heavy rain such that overflow of the drainage channel is common, and the channel can be altered significantly during major rain events, creating new channel segments. A topographic divide between the Site and the Seboruco community reportedly isolates surface water runoff from the Site from draining through Seboruco (Hart, 1987).

Surface hydrology was also analyzed by Geosyntec using Digital Elevation Model (DEM) imagery and the D8 flow method.[9] **Figures 6, 7,** and **8** illustrate inferred surface water flow paths, drainage orders, and drainage basin extents. **Figure 6** illustrates surface hydrology in the immediate vicinity of the Site, wherein surface water from the Site, PVL, and areas to the northeast of the Site (at higher elevations than the Site) collectively flow and discharge to the south and southwest from the Site alongside the access road to PR Road 385. From there, surface water flow discharges further southwest and reaches the Tallaboa Bay and Atlantic Ocean as shown on **Figure 7**, which illustrates surface hydrology within the drainage basin containing the Site and PVL (referred to as the unnamed creek drainage basin). Undeveloped, higher elevation areas to the north and east of the Site are included in the unnamed creek drainage basin, however, mountain ridges located farther north and east of the Site are inferred to be the boundary of this drainage basin such that the Ecosystems Landfill is located within a separate drainage basin. Surface water originating within the Ecosystems Landfill is not anticipated to impact the unnamed creek drainage basin. **Figure 8** illustrates surface hydrology within three (3) miles of the Site as well as wetlands included in the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory.

[9] Additional details of the calculation methods used to evaluate surface hydrology are provided on the listed figures.

3.2 Land Use

Surrounding land uses in the area of the Site are illustrated on **Figure 9.** The heavy industrial use area, which includes the Site, PVL, and Ecosystems Landfill is surrounded by resource conservation land to the north, west, and south, followed by residential communities and light industrial land use approximately 1 to 1.5 miles from the Site. Lands to the east of the Site beyond the Ecosystems Landfill are identified as rural or industrial.

3.3 Locations of Public Water Supply and Private Wells

Several potable and industrial wells have been reported to exist within four (4) miles of the Site based on a well survey conducted by Weston in 2017 and information provided to Weston by various well operators (Weston 2017a, 2017b). The identified wells include two (2) drinking water supply wells operated by the Puerto Rico Aqueduct and Sewer Authority (PRASA), the closest of which is located approximately 1.5 miles west of the Site (Carlos Andinos well). This well reportedly provides drinking water for an estimated population of 2,892 people (**Figure 10**). The second drinking water supply well, the Blasini well, is located 3.5 miles east of the Site and is reported by PRASA to be a backup well that serves approximately 200 to 300 residences in Ponce (Weston 2017b).

Weston also identified several private wells within four (4) miles of the Site during the 2017 well survey. Three domestic drinking water wells were identified in Tallaboa Saliente and Cuebas that reportedly serve a total of ten (10) individuals.[10] Four wells operated by the Puerto Rico Electric Power Authority (PREPA) to provide industrial process water and drinking water to 207 employees were also identified, along with an irrigation well.

The total apportioned population that obtains drinking water from groundwater wells within two (2) miles of the Site was calculated by Weston to be 3,109 people. Additionally, groundwater springs are reportedly present in the Rio Tallaboa Valley approximately one and a half to two (1.5 to 2) miles west of the Site that have historically been used or drinking water supply (Weston, 2018). Information on sampling of certain potable wells near the area of the Site in 2018 by Weston is provided in **Section 4.4**.

3.4 Geology and Geomorphology

3.4.1 Regional Geology

Regional geologic formations that underlie the Peñuelas area in southern Puerto Rico include, in ascending order, a basal sequence of volcaniclastic rocks and limestones of the Lago Garzas and

[10] In addition to the wells listed in this section, Weston collected Global Positioning System (GPS) coordinates of seven locations identified as "Possible Domestic Well[s]" in Tallaboa Saliente, four locations in Corco, and seven locations in Seboruco/North Seboruco in June 2017 (Weston 2017a). These locations, interpreted to be possible wells identified during initial reconnaissance, were not later identified in the *Groundwater Population* project note/memorandum (Weston 2017b) or the report presenting off-site sampling activities (Weston 2018); these locations are inferred to have been excluded by Weston due to lack of additional information confirming well usage or findings that these were not operating wells at the time of Weston's sampling. This may be further evaluated as part of the RI.

Yauco Formations of Late Cretaceous Age (pre-Oligocene basement), fossiliferous limestones, chalk and terrigenous (epiclastic) sediments of the Juana Díaz Formation of Oligocene to Miocene Age, and crystalline fossiliferous limestones of the Ponce Limestone of Miocene Age. According to the USGS Geologic Map of the Peñuelas and Punta Cucharas Quadrangle (1978), the Juana Díaz and Ponce Limestone sequences rest unconformably, with a generally southward, gentle dip over the Cretaceous basal rocks. These formations extend from areas near the Municipality of Guanica to the west of Peñuelas to an area east of the Municipality of Ponce. River valleys, gullies and deeply entrenched basins in the area are generally underlain by variably thick deposits of Pleistocene to Holocene (recent) alluvium and/or landslide deposits consisting of cobble, pebbles, and sand. **Figure 11** illustrates the geologic formations in the vicinity of the Site. The general lithology of the Juana Díaz and Ponce Limestone formations (in descending order) is described below.

Ponce Limestone

The Ponce Limestone unconformably overlies the Juana Díaz Formation and consists of very pale orange to grayish orange, highly fossiliferous and crystalline sandy limestones. According to the USGS, the Ponce Limestone rocks are approximately 650 to 2,600 feet thick and presently cap the surrounding hills to the south and east of the Peñuelas area. Due to erosion, Ponce Limestone rocks are not present at the Site.

Juana Díaz Formation

The Juana Díaz Formation, as indicated by the USGS, consists of at least four distinct lithologic members. The uppermost unit is a discontinuous deposit of channel-fill clastic sediments in a fine-grained sand and calcareous clay matrix with a maximum thickness of approximately 150 feet. This upper unit is underlain by a limestone chalk member consisting of white to very pale orange chalk and chalky limestone containing foraminifera with a thickness ranging from approximately 150 feet west of the Site to about 1,000 feet east of the Peñuelas area. The chalk member (also named as Angola Limestone by the USGS) is underlain by the limestone member, a white to grayish-orange fossiliferous and crystalline, coralline (reef-building corals) limestone, approximately 0 to 1,200 feet thick, containing lenses of cobbles and sandy mudstones that could be up to 30 feet thick. Near the Site and to the east of the Peñuelas area, the limestone member intertongues with an underlying mudstone and basal-conglomerate member, which consists of grayish orange (when weathered) and light-blue gray, calcareous, silty to sandy carbonaceous clay, interbedded with calcareous sandstones, sand, clay, and sandy gravel (cobbles of volcanic and intrusive rocks). The thickness of the mudstone and basal conglomerate member ranges from approximately 400 feet in the western part of Peñuelas to 1,200 feet near Ponce to the east.

The structural geology of the area is dominated by a major fault zone (Great Southern Puerto Rico Fault Zone), located approximately 2.5-3.0 miles north of the Site. This fault zone occurs primarily within the pre-Oligocene basement rocks and consists mainly of numerous northeast-southwest trending, strike slip and oblique compressional (reverse) faults. To the south of the fault zone, normal faulting, associated with localized tectonics, is suspected to have formed the Tallaboa River

Valley, located about 2 miles west of the Site. The area south of the mouth of the Tallaboa River has recently been the location of numerous earthquakes that have affected the southern Puerto Rico area since 2019. The structural geology data presented by the USGS suggests that the younger Juana Díaz and Ponce Limestone stratified units essentially form a homoclinal structure (with a south dip) over the basement rocks. As shown on **Figure 11**, some inferred geologic faults and a compressional fault with a general east-west orientation have been mapped by the USGS immediately to the north and east of the Site based on the attitude (strike and dip) measurement changes of the Juana Díaz strata. These faults are not known to be active and appear to occur in isolated areas of the carbonate belt. Smaller, compressional faults have been observed within the Juana Díaz chalk member at the Site.

3.4.2 Local Geology and Geomorphology

The geology of the Site was investigated with exploratory borings to a depth of approximately 300 feet below land surface (ft BLS) during the 1985-1987 "Phase 1A Hydrogeologic Investigation" (Hart, 1987). The lithologic units identified at the Site during previous investigations are assigned to the Juana Díaz Formation (with the exception of shallow alluvial deposits) and are listed in descending order as follows (USEPA, 1986b):

- **Shallow Alluvium** – discontinuous (found in lowermost areas of the Site's central valley) deposits of sand, gravel, and cobbles in a clay and silt matrix, present between approximately land surface and 25 ft BLS. Hart (1987) noted that the shallow alluvial deposits were largely removed from the Site either during construction of the facility or during landfill cover installation;
- **Upper Chalk Member** (USGS Angola Unit) – silty clay and chalky silty limestone of variable thickness that due to erosion is not present everywhere within the Site and was instead encountered in select borings only (such as elevated areas in valley walls to south and west of the Site);[11]
- **Brown (Weathered) Silty Clay** – an orange-brown, unconsolidated weathered zone of the underlying marine silty clay, with distinct gypsum-filled veins, which has a slightly lower degree of fines than the underlying gray silty clay, ranging in thickness between 15 and 84 feet thick;
- **Gray Silty Clay** – cohesive but unconsolidated marine silty clay which intertongues with the underlying limestone unit and is discontinuous throughout the Site with a thickness ranging between 120 to 180 feet; and
- **Reef Limestone** – white to orange and gray, hard recrystallized micritic and highly fossiliferous limestone with soft chalky interbeds, in some areas overlain by a zone of soft and chalky caliche carbonate. In the southern portion of the Site, reef limestone was encountered at depths around 300 ft BLS during the Phase IA investigation,

[11] Numerous visits to the Site in the fall of 2020 and spring of 2021 by Geosyntec confirm the presence of the chalk member rocks surrounding the elevated areas of Site.

although it is presumed that the entire Site is ultimately underlain by this unit (Fred C. Hart, 1987; CDM, 1992).

Boring logs historically collected on Site indicate that the Brown Silty Clay and the Gray Silty Clay units have similar lithological characteristics. The color change between the two units is gradational and both are comprised of clay, silt, sand, limestone clasts, gypsum veins, and calcareous deposits with abundant fractures. Therefore, calcareous clay and silty clay deposits present on Site can be geologically unified as a Calcareous Silty Clay unit that is likely the weathered remnants of the underlying limestone (Ertec, 1983; USGS, 1998). A review of subsurface investigation reports suggests that the Calcareous Silty Clay underlies every waste management unit at variable depths. At some locations, including in the vicinity of Waste Units 1, 2, 3, 9, and the northern portion of Waste Unit 14, the gray silty clay was not observed, and the brown silty clay is in direct contact with reef limestone (CDM, 1992).

Additionally, isolated lenticular deposits of reef limestone have been reported within the Calcareous Silty Clay at depths greater than 200 ft BLS. These deposits ranged between 5 to 10 feet in thickness in the vicinity of the Site (OHM, 1994). Depths to the reef limestone vary from 10 ft BLS to greater than 300 ft BLS across the Site (CDM, 1992).

A general geologic cross-section of the Site location is provided on **Figure 11**. Historical interpretations of subsurface profiles and stratigraphic correlations at the Site presented within previous reports differ in terms of depth and continuity of lithologic units. A Site-specific cross-section will be prepared during the RI following additional subsurface investigation.

The geomorphology of the Site and surrounding areas is illustrated in the Surface Relief Map (**Figure 12).** This relief map was generated by processing high-resolution 2018 DEM data. The Site lies within the low ridges of the Southern Foothills of the island (Monroe, 1980). As shown on the map, the landforms in the central portion of the landfill complex valley include notable graded areas where disposal units are located. The map also shows excavated areas where extraction of earth materials occurred. Leachate and sedimentation ponds are shown on **Figure 12**.

Figure 12 also shows the current drainage configuration of the central valley where the Site and the Peñuelas Valley Landfill are located. The surrounding foothills to the north, east, and west provide an idea of what the natural geomorphologic conditions of the Site were prior to the construction of the landfills. The observed steep slopes are separated by highly incised stream valleys and gullies that are the result of continuous denudation and/or the presence of localized faulting of the Oligocene to Miocene Age, Ponce and Juana Díaz formations. These types of landforms are typically associated with poorly consolidated (highly erodible) geologic materials such as the underlying Miocene Juana Díaz chalk member.

3.5 Hydrogeology

The Site is located within the South Coast Groundwater Province, which is characterized by limestone hills, alluvium-filled valleys, and coastal plains. Regionally, two (2) aquifers are present: (1) the Ponce-Juana Díaz aquifer, comprised of the Juana Díaz Formation and the Ponce

Limestone, and (2) the Río Tallaboa alluvial aquifer. Only the Juana Díaz Formation aquifer underlies the Site as discussed in **Section 3.4.1**.

3.5.1 Hydrogeologic Units

Locally, three (3) hydrogeologic units have been identified at the Site during multiple hydrogeologic studies (CDM, 1992; Hart, 1987; OHM, 1994) at the following approximate depths and unit thicknesses:

- **Shallow Alluvium** – approximately 0 to 25 ft BLS, with a saturated thickness ranging from 5 to 15 ft, where present;
- **Calcareous Silty Clay (Principal Water-Bearing Unit)** – approximately 12 to 220 ft BLS with a discontinuous saturated thickness that ranges from 0 to 150 ft; and
- **Reef Limestone** – approximately 15 to 300 ft BLS with a saturated thickness ranging from 60 to 200 ft.

The shallow alluvium aquifer is unconfined. Confining to semi-confining conditions have been reported in the deeper portion of the Calcareous Silty Clay and the Reef Limestone due to the very low hydraulic conductivity of certain zones of the Calcareous Silty Clay unit. However, confining conditions may be localized due to geologic heterogeneities (OHM, 1992; CDM, 1992). The hydrogeologic units are further described below.

3.5.1.1 Shallow Alluvium

As specified in **Section 3.4.2**, the Shallow Alluvium unit only occurs sporadically as surface or near-surface deposits in the lowermost areas of the Site's central valley. Slug testing conducted in two Shallow Alluvium wells indicated that the hydraulic conductivity is relatively low compared to the Calcareous Silty Clay and Reef Limestone units with an average value of 0.07 ft/day (OHM, 1994). However, given that this unit is comprised of sand, gravel, and cobbles in a clay and silt matrix, hydraulic conductivity is likely highly variable spatially. This average hydraulic conductivity value was obtained from only two wells located in close proximity during a single event; therefore, slug testing in multiple wells will be required for greater spatial distribution.

Groundwater in the Shallow Alluvium is generally brackish with reported salinity values of approximately 6 parts per thousand (‰).[12] Water quality parameters including concentrations of chloride, sodium, sulfide, and total dissolved solids (TDS) and electrical conductivity are summarized in **Table 2**.[13] These water quality values were obtained from a limited number of sampling events and wells located in close proximity to one another. Greater spatial and temporal distribution of sampling points will be required to characterize the water quality.

[12] Salinity values reported in the February 1987 *Phase 1A Report* (Fred C. Hart Associates, Inc.) are in units of percentage. Based on information provided in the September 30, 1992 *Draft RFA Update* (CDM), units are interpreted to be parts per thousand (‰).

Limited precipitation and significant evapotranspiration in the area are inferred to be the cause for the relatively high ionic strength and brackish conditions in the Shallow Alluvium. Tritium isotope analyses conducted in the Shallow Alluvium indicate the water is relatively young (post-1954), and recharges directly from local rainfall (CDM, 1992).

3.5.1.2 Calcareous Silty Clay (Principal Water-Bearing Unit), Reef Limestone, and Deep Lenticular Deposits

The Calcareous Silty Clay and Reef Limestone units are present throughout the Site with spatially variable thicknesses. The Calcareous Silty Clay unit thins to the north with an approximate thickness of 12 ft underneath Waste Units 1, 2, and 3 and pinches out against limestone outcrops north of these waste units. The Calcareous Silty Clay unit is also referred to in historic reports and herein as the Principal Water-Bearing Unit. A transition zone appears to exist between 200 and 300 ft BLS where isolated lenticular deposits of Reef Limestone have been reported within the Calcareous Silty Clay. Slug testing conducted in four Calcareous Silty Clay wells and one Reef Limestone well yielded hydraulic conductivity values that varied by two orders of magnitude (0.03 – 7.59 ft/day), indicating that both units are highly heterogenous and groundwater flow likely occurs through preferential pathways. This range was obtained from only five wells and greater slug testing spatial distribution will be required in future efforts (OHM, 1994).

The presence of gypsum veins and fractures in the Calcareous Silty Clay represent the main pathways for groundwater flow laterally and vertically towards the Reef Limestone. Groundwater flow within the Reef Limestone is likely controlled by the presence of solution channels that also represent preferential flow paths (OHM, 1992; OHM, 1994; Weston, 2019).

Groundwater at the Site in the Calcareous Silty Clay is highly saline with reported salinity values ranging between 16 and 37‰. The electrical conductivity and concentrations of chloride, sodium, sulfate, and TDS are higher compared to Shallow Alluvium groundwater (**Table 2**). Tritium isotope values measured in the Calcareous Silty Clay revealed relatively old water (recharged prior to 1954), indicating very limited recharge from local precipitation.

Salinity, chloride, sodium, sulfate, and TDS concentrations are lower in the Reef Limestone unit compared to the Shallow Alluvium and the Calcareous Silty Clay (**Table 2**). Groundwater in the deep lenticular deposits exhibited similar water quality to the Reef Limestone unit (OHM, 1994). These values were obtained from a limited number of wells and monitoring events, and greater temporal and spatial distribution will be required in future efforts to characterize the water quality. Tritium isotope analyses conducted in the Reef Limestone indicate relatively young water with ages similar to the Shallow Alluvium (post-1954). Previous studies hypothesized that recharge to the Reef Limestone occurs via rainfall captured in the mountainous areas located to the north of the Site where water percolates and flows through solution channels towards the Site (Hart, 1987; CDM, 1992).

3.5.2 Hydraulic Connection Between Units

Hydraulic connection or separation between the Calcareous Silty Clay (Principal Water-Bearing Unit) and the Reef Limestone has not been conclusively proven during past Site investigations. Hydrogeologic reports prepared for the Site suggest that the water chemistry contrasts and the vertical hydraulic differential between the Calcareous Silty Clay and the Reef Limestone are indicative of hydraulic separation (Hart, 1987; CDM, 1992). However, other reports indicate that hydraulic connection is plausible due to the downward vertical gradient and the presence of gypsum veins that may generate vertical preferential flow paths from the Calcareous Silty Clay to the Reef Limestone. The presence of organic contamination attributable to Site releases (Section 4) has been detected in the Reef Limestone near the Oil Lagoon, further indicating a potential hydraulic connection (OHM, 1992; OHM 1994; Weston, 2019). Due to inconclusive and contradictory information regarding hydraulic connection between the Calcareous Silty Clay to the Reef Limestone, additional investigations are needed.

3.5.3 Groundwater Elevation and Flow Direction

Site groundwater elevation measurements indicate that the general direction of groundwater flow in the Calcareous Silty Clay (Principal Water-Bearing Unit) is towards the south and southwest (**Figure 13**) which is consistent with valley floor topography, while groundwater flow in the Reef Limestone is to the north (**Figure 14**). However, due to the limited number of measurements in the Reef Limestone, the estimated flow directions may not be reliable and further investigations are required. Additionally, groundwater flow in the shallow alluvial and deep lenticular deposits have not been assessed due to limited wells screened in these units and the discontinuity between the deposits (CDM, 1992; OHM, 1992; OHM 1994).

4. EVALUATION OF EXISTING DATA

4.1 Locations and Areal Extents of Waste Disposal Units

To identify the locations and areal extents of former waste disposal units, Geosyntec evaluated information presented in the *HRS Report* (Weston, 2019), historical site survey plans, aerial photographs, surface relief maps, satellite imagery, and surface relief conditions observed during Site visits in 2021 and 2022. Collectively, these sources of data provide evidence that the locations and areal extents of former waste disposal units differ in some cases from those presented in the *HRS Report*. The locations and areal extents of the former waste disposal units based on Geosyntec's synthesis of the data are presented on **Figures 3** and **4**. Historical aerial photographs from the United States Geological Service (USGS) dated 1977, 1983, 1993, and 2010 that were used to evaluate former Site features are included in **Attachment C**.

Waste Units 1, 2, 3, 5, 7, 9 through 17, and the portion of Waste Unit 4 located within the PROTECO-controlled fenced area, were surveyed between March and April 2022 by Right Way Environmental Contractors, Inc. (RWE). Geosyntec identified and marked the waste disposal units in the field following the review of the sources listed above and observations of ground surface relief before RWE surveyed the base of the units. A discrete location for Waste Unit 15 was not surveyed since this unit consisted of an AST, which was reportedly being removed during closure activities (See **Section 4.3** below) and could not be identified based on historical aerial photographs or surface relief data. This waste unit was reportedly located within the area of the CAMU.

The 1999 metes and bounds survey description of capped landfill areas included in the *Hazardous Waste Management Unit Post-Closure Care Permit Application* (Law Environmental – Caribe, 1999a) provided initial approximate locations and dimensions of Waste Units 1, 2, 3, 5, 9 through 13, 16, and 17 based on the survey of the tops of these disposal units. The areal extents of these waste units identified in the 2022 survey are larger than the extents presented in the 1999 survey and the *HRS Report* (Weston, 2019). Waste Units 7, 14, and 15 were not included in the 1999 survey.

Waste Units 4, 6 and 8 were not included in either the 1999 or 2022 surveys. Based on the historical data, a significant portion of Waste Unit 6 and the western portion of Waste Unit 4 were located outside of the PROTECO-controlled area and within the eastern portion of the current area operated by PVL. The locations and approximate surface extents of Waste Units 4, 6, and 8 shown on **Figures 3** and **4** were digitized from historical survey maps and inspection reports included in the *HRS Report* (Weston, 2019), and were geo-referenced and correlated using other documents and aerial photographs.[14] Professional judgment was applied to evaluate data source validity where

[14] Other reviewed documents include the *Phase III Soil Investigation* report (Hart Engineers, Inc., 1988), *Phase 1A Hydrogeologic Investigation* report (Fred C. Hart, 1987), *Letter to USEPA RE: Site Reassessment Letter* (Commonwealth of Puerto Rico, 2005), and *Work Plan for Closure of Unit No. 6 Sanity Landfill* (Fred C. Hart, 1986).

multiple sources presented conflicting Site feature locations. The documents reviewed also suggested that Site features were historically located within the eastern portions of PVL, including two former PROTECO maintenance buildings, multiple monitoring wells, and historical soil sample locations (**Section 4.4**).

4.2 Hazardous Substances

Waste accepted at the facility reportedly included electroplating sludge, wastewater treatment plant sludge, slurries, petroleum waste, pesticide waste, pharmaceutical and manufacturing waste (Weston, 2019), and asbestos brake lining (Fred C. Hart, 1986). Hazardous substances reportedly present in the waste received at the Site included:

- inorganics (e.g., arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver);
- ignitable substances;
- corrosive substances;
- halogenated solvents (e.g., tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, 1,1,2-trichloroethane);
- non-halogenated solvents (e.g., creosols, toluene, xylene, acetone, methanol, ethyl acetate, nitrobenzene);
- electroplating wastewater treatment sludge with hexavalent chromium, lead, and cyanide;
- other organic compounds (e.g., chloroform; acetonitrile; propanol; chloropropane; 1,2-dichloroethane (DCA); benzene; acetaldehyde; acetophenone; cyclohexane; hexachlorocyclopentadiene; xylene; dibromomethane, fluoroacetic acid, and dichlorobenzene) pyridines; phthalic anhydride; chlorinated hydrocarbon waste; and
- pesticides (heptachlor and toxaphene) (Commonwealth of Puerto Rico, 2005).

Table 1 identifies the waste units and the substances believed to have been managed or disposed within each unit. **Table 3** presents USEPA hazardous waste code designations for materials managed or disposed within waste units, as identified in the documents reviewed.

Waste Units 1, 2, 3, 4, 5, 7, 9, 10, 11, 12, 13, 15, 16, and 17 were reportedly used for hazardous waste storage or disposal. Waste Units 6, 8, and 14 were reportedly designed for non-hazardous material (USEPA, 1986a). Historical records also suggest that these units may have contained hazardous material during the Site's operational period (**Table 1, Section 2.4**).

Corroboration of these locations was confirmed by delineating and mapping geo-referenced historical excavation, filled, and/or cleared areas observed on historical aerial photos corresponding to the years of the PROTECO operations depicted in the referenced report maps (Attachment C-5).

4.3 Closure of Disposal Units at the Site

4.3.1 Closure of Hazardous Waste Units

Between approximately 1997 and 1999, hazardous waste unit closure activities were conducted following USEPA approval of the 1996 *Closure and Post Closure Plan* (OHM, 1996a) and *Corrective Action Management Unit Proposal for Waste Units 4, 7, 9, and 15* ("*CAMU Proposal*"; OHM, 1996b). The type of closure, which varied by unit, consisted of waste excavation, removal, and/or consolidation in other units. Some units were capped (with a final cover system) without removal of wastes. **Table 4** and **Figure 15** summarize closure activities reportedly conducted for each waste unit, including the types of cover system constructed at each unit, where applicable.

A CAMU was constructed for the disposal of waste material excavated from Waste Units 4, 7, 9, and 15. The CAMU is reported to have been constructed at the approximate location of Waste Unit 9 and was closed in place with Waste Units 10, 11, 12, and 16 under the same continuous cover system. Material was not excavated from Waste Units 10, 11, 12, and 16 prior to closure. The CAMU construction generally consisted of waste placement on top of a low-permeability soil and liner that was then covered with a final cover system. Specific construction of the CAMU consisted of the following in descending order (Law Environmental - Caribe 1999b):

- a final cover system:
  - 12 inches of aggregate
  - 18 inches of common soil fill from on-Site borrow sources
  - 16-ounce woven geotextile
  - 40-millimeter high density polyethylene (HDPE) flexible membrane
  - a geosynthetic clay liner
  - compacted soil cover from on-Site borrow sources
- waste from Units 4, 7, and 9;
- a 60-millimeter HDPE flexible membrane;
- a geosynthetic clay liner;
- 2 feet of low permeability soil cover from on-Site borrow sources (permeability no more than $1x10^{-5}$ centimeters per second); and
- backfilled soil from on-Site borrow sources.

The same type of final cover system as the CAMU is reported to have been installed at Waste Units 1, 2, 3, 5, 13, and 17, which were closed separately from the CAMU. Waste Units 2 and 3 were closed under a combined cover system and Waste Units 1, 5, 13, 17 were closed with individual cover systems. The documents reviewed do not indicate that Waste Units 1, 2, 3, 5, 10, 11, 12, 13, 16, or 17 were lined along the base or sidewalls during closure like the CAMU.

Waste and/or underlying soil is reported as having been removed only from Waste Units 4, 7, 9 and 15 during closure activities. The *CAMU Proposal* (OHM, 1996b) specified that Waste Units 4, 7, and 9 were to be excavated to meet Corrective Action Goals to achieve "clean closure" of Waste Units 4 and 7 and prepare Waste Unit 9 prior to CAMU construction. The Corrective Action Goals included a combination of the USEPA Region III Risk Based Concentrations (RBCs) for soil ingestion in an industrial scenario, Toxicity Characteristic Leaching Procedure (TCLP) criteria for metals, pesticides, and polychlorinated biphenyls (PCBs), and values established based on-Site background levels (OHM, 1996b).[15] However, background sampling activities and results were not reported in the *Closure Certification Document for PROTECO Landfill Closure* ("*Closure Certification Document*"; Law Environmental – Caribe, 1999b) and final excavation depths appear to be based on other criteria.

Excavations created during the removal of waste material from Waste Units 4 and 7 are not reported to have been backfilled and were instead described as having been graded to provide positive drainage of stormwater away from the units. No cover system was installed at the locations of Waste Units 4 or 7 after removal of material from these units and placement into the CAMU (Law Environmental – Caribe, 1999b). Post-excavation soil sampling within these units is discussed in **Section 4.4.3**.

The contents of the AST in Waste Unit 15 were reportedly removed. The *Closure and Post Closure Plan* did not specify excavation of any underlying soil during closure. Cover systems were installed without removal of waste material at Waste Units 1, 2, 3, 5, 10, 11, 12, 13, 16, and 17 (OHM, 1996a; Law Environmental – Caribe, 1999a).

Control measures specified in the *Closure and Post Closure Plan* included run-on and run-off control through permanent drainage channels surrounding the waste units, a leachate monitoring system consisting of three downgradient groundwater monitoring wells, drainage channels and silt fences to route surface water to a constructed sediment basin, and passive vents for decomposition gases.[16] During closure, the sediment basin was excavated to contain stormwater from closed, covered hazardous waste units, surrounding drainage areas, and the remaining non-hazardous waste landfill (Waste Unit 14). The sediment basin was designed for solids settling and discharge of supernatant from an outfall (OHM, 1996a). Additional information regarding waste unit closure is reported in the *Hazardous Waste Management Unit (HWMU) Post-Closure Care Permit Application* (Law Environmental – Caribe, 1999a).

In April 1999, Resources Management, Inc. DBA PROTECO submitted the *Closure Certification Document* to USEPA documenting completed closure activities (Law Environmental – Caribe, 1999b). A revised closure certification document incorporating "minor" revisions requested by

[15] Maximum concentrations of contaminants for the characteristic of toxicity per the Toxicity Characteristic Leaching Procedure are established in 40 CFR 261.24.

[16] The sediment basin identified in the *Closure and Post Closure Plan* (OHM, 1996a) and *Closure Certification Document* (Law Environmental – Caribe, 1999b) is the existing stormwater control/sedimentation pond located to the south of the Site (**Figure 2**).

USEPA in response to the April 1999 *Closure Certification Document* does not appear to have been resubmitted to USEPA.

4.3.2 Closure of Non-Hazardous Waste Units

Waste Units 6, 8, and 14 are identified in Site documents including the *Closure and Post Closure Care Plan* (OHM, 1996a) as non-hazardous units despite historical records suggesting that hazardous material may have been disposed in each of these units as described in **Section 2.4**.

The 1986 *Work Plan for Closure of Unit No. 6 Sanitary Landfill* (Fred C. Hart, 1986) states that waste from Waste Unit 6 were planned for excavation and relocation to Waste Unit 14. This closure work plan further states that in the absence of detailed records regarding exact types and quantities of wastes disposed within Waste Unit 6 and because some SQG hazardous wastes were believed to have been disposed within the unit, a waste segregation program would be implemented to characterize materials prior to final disposition. A revised work plan reflecting additional details was requested by USEPA following their review of the work plan (USEPA, 1986). It is not known if a revised work plan for closure of Waste Unit 6 was submitted to, or approved by, USEPA.

According to the 1999 *HWMU Post-Closure Care Permit Application,* as of July 1999, waste was excavated from Waste Units 6 and 8 and placed into Waste Unit 14, landfilling operations within Waste Unit 14 had ceased, and the unit was undergoing closure activities. A former PROTECO employee reportedly stated that Waste Unit 14 was capped with geosynthetic clay and soil when Site operations ended (Weston, 2019). Further details of the cover system and closure activities for Waste Unit 14 were not identified in reviewed documents. It is unknown if a liner was installed during closure of Waste Unit 14.

No information on post-excavation soil sampling, backfilling, or cover systems was identified in the documents reviewed for Waste Units 6 and 8, nor was any survey information regarding final extents of Waste Units 6, 8, or 14 identified. A formal USEPA acknowledgement of PROTECO's closure of the above non-hazardous waste units has not been found.

4.3.3 Post Closure Care Activities for Hazardous Waste Units

Post closure activities for the fourteen (14) closed hazardous waste units were to occur for thirty (30) years pursuant to the *Closure and Post Closure Plan* (OHM, 1996a). The post closure care activities proposed included inspection and maintenance of waste units' final cover systems, run-off controls, erosion controls, the gas management system, survey benchmarks, and Site security (OHM, 1996a).

Groundwater monitoring was not proposed by PROTECO as part of the *Closure and Post Closure Plan* or in the *HWMU Post-Closure Care Permit Application* (Law Environmental – Caribe, 1999a). A dye tracer study was proposed by PROTECO to characterize Site hydrology and evaluate if Site-related contaminants in groundwater had migrated into the Reef Limestone aquifer (Law Environmental – Caribe, 1999a). The results of the study were intended to provide evidence that groundwater monitoring was not required as part of post closure care activities; however, the

study does not appear to have been conducted. USEPA did not provide formal approval that groundwater monitoring could be waived from post-closure care requirements. Based on documents reviewed, a Post-Closure Care Permit does not appear to have been issued to PROTECO by USEPA.

PROTECO conducted certain RCRA post-closure maintenance activities between 1999 and 2004, including inspections of Site security controls, erosion damage, final cover conditions, the landfill gas management system, and the CAMU leachate collection system (Law Environmental – Caribe, 2000, Law Engineering - Caribe, 2001, and Law Engineering - Caribe, 2005). Annual RCRA inspection and maintenance reports indicate that some inspection and maintenance activities were completed while others were not. For example, landfill leachate levels in the CAMU leachate collection system were measured during some but not all inspection events. Post-closure activities are reported by USEPA to have ceased sometime between 2001 and 2009 (USEPA, 2017). Site observations made during the post-closure period reported in historical records are presented on **Table 4** and **Figure 16**.

4.4 Historical Sampling and Monitoring

4.4.1 Groundwater

Locations of thirty-eight (38) known historical monitoring wells screened within the various water-bearing units at the Site are shown on **Figure 17.** An inventory of groundwater monitoring wells associated with the Site is included in **Table 5** and includes six (6) additional wells**.** As of April 2018, forty-four (44) of the groundwater monitoring wells at the Site were reported to be damaged or no longer existing (Weston, 2018).[17]

Groundwater monitoring was conducted intermittently from the period of active facility operations until 1994. PROTECO is reported to have developed and installed a groundwater monitoring system in 1981 (USEPA, 1985), and the first sampling event for which partial analytical data is available is July 1982. The *Phase 1A Hydrogeological Investigation* conducted by Fred C. Hart Associates, Inc. between 1985 and 1987 represented the first comprehensive study conducted to comply with hydrogeological investigation and groundwater monitoring requirements established in the 1985 Administrative Order of Consent. Based on records reviewed to date, sampling of site groundwater monitoring wells does not appear to have been conducted following closure of waste units at the site in 1999.

Table 6 presents a summary of the known groundwater monitoring events conducted at the Site, including the number of wells within each water bearing unit that were sampled, the analytes for which samples were analyzed, and parameters that were detected above either the laboratory detection limit, the USEPA Drinking Water Primary Maximum Contaminant Level (MCL), the USEPA Drinking Water Secondary Maximum Contaminant Level (SMCL), and/or the USEPA

[17] Weston reports 44 known wells at the Site (2018). Geosyntec located and compiled construction information for 38 former wells (**Table 5**).

Regional Screening Level (RSL) for Tap Water if an MCL or SMCL does not exist.[18] Volatile organic compounds (VOCs) and metals were the primary constituents analyzed during the majority of groundwater monitoring events at the Site. Limited sampling of groundwater for semi-volatile organic compounds (SVOCs), pesticides, herbicides, PCBs, or other constituents was conducted. Limited data is available for wells screened in the shallow alluvial deposits and deep lenticular deposits.

4.4.1.1 Analytical Results

Tables 7A and **7B** present summaries of concentration ranges for VOCs and metals detected in groundwater monitoring wells between 1982 and 1994. **Table 2** presents groundwater quality parameter measurements. Results are grouped by the monitoring well depth unit. A review of groundwater data was completed by Geosyntec for the purpose of identifying concentration ranges of detected analytical suites (e.g., VOCs and metals) within different water-bearing units and to identify monitoring well locations displaying the highest contaminant concentrations. A detailed evaluation of all constituents and concentration gradient mapping was not completed as part of the SPTM. **Figure 18** illustrates the sampling results screened against the USEPA MCLs, SMCLs, and/or the USEPA RSL for Tap Water.

The majority of groundwater monitoring conducted at the Site consisted of monitoring of wells screened within the Principal Water-Bearing Unit. Concentrations of VOCs including tetrachloroethene (PCE), trichloroethene (TCE), 1,2-DCA, trans-1,2-dichloroethene (DCE), 1,1-DCE, and methylene chloride detected in Principal Water-Bearing Unit monitoring wells exceeded the MCLs (**Table 7A**). The most elevated concentrations were detected at well 58MWS-88 located immediately west of the CAMU.

VOCs were also detected above MCLs in Shallow Alluvial monitoring wells, 36WVS-86, 77MWS-88, and 78MWS-88 located west of the CAMU and combined cover system at Waste Units 9, 10, 11, 12, and 16.

While reports reviewed to date reveal limited monitoring data for monitoring wells screened within the Reef Limestone, many of the highest VOC concentrations detected at the Site were from samples collected from Reef Limestone monitoring wells. Monitoring well 50WD-86 generally revealed the highest concentrations of PCE, TCE, trans-1,2-DCE, and 1,1-DCE reported at the Site (USEPA, 1987; CDM, 1992). The location of well 50WD-86 is approximately 70 feet north of Waste Unit 9 (Oil Lagoon), which was interpreted to be downgradient of the Waste Unit 9 (**Section 3.5.3**, **Figure 14**).[19] At monitoring well 27WD-86 located east-southeast of Waste Unit 9 (i.e., side-gradient/upgradient) and designated background well 52WD-86 located approximately 2,000 feet northwest (i.e., side-gradient) of Waste Unit 9, TCE and/or PCE were reported with laboratory

[18] Results are compared to the USPEA MCLs, SMCLs, and/or the USPEA RSL for Tap Water for initial screening only. These levels are not presented as remedial cleanup goals.

[19] Monitoring well 50WD-86 is identified as being 200 feet north of Waste Unit 9 in the *HRS Report* (Weston, 2019). Based on Geosyntec's evaluation of waste unit location and extents (**Section 4.1**), this well is identified herein as approximately 70 feet north (downgradient) of Waste Unit 9.

flags defined as "presence of material verified, but not quantified" suggesting potential for impacts to these wells (USEPA, 1987).

Metals were detected above USEPA MCLs in Site groundwater within all sampled water-bearing units (**Table 7B).** In general, metals concentrations detected in Reef Limestone wells were lower than concentrations detected in Principal Water-Bearing Unit and Shallow Alluvial wells, while VOCs were typically detected at higher concentrations in Reef Limestone wells 50WD-86 than in Principal Water Bearing Unit wells.

4.4.2 Off-Site Potable Wells

In April 2018, off-Site potable wells located between approximately 1.75 and 2.5 miles west-northwest of the Site were sampled by Weston for analysis of VOCs, SVOCs, pesticides, PCB aroclors, and metals including mercury and cyanide. The sampled wells included two (2) domestic wells in the Seboruco community (Tallaboa Saliente 8 and 9) and one (1) domestic well in the Cuebas community, an irrigation well in Seboruco, and three (3) supply wells operated by the PREPA (Weston, 2018). The reported well depths ranged from 60 to 200 ft BLS (Weston, 2018). Sampled well locations are illustrated on **Figure 19**.

The Carlos Andinos public water supply well (380,000 gallons per day) operated by PRASA was not sampled by Weston since "*analytical data obtained by USEPA's Pre-Remedial Section for the PRASA public supply well, prior to being combined with the water from the surface water intake, and spanning the years 2010 through 2017, does not indicate VOC contamination*" (Weston, 2018).

4.4.2.1 Analytical Results

Results of the 2018 groundwater sampling of off-Site potable wells west-northwest of the Site did not indicate that the analyzed constituents (VOCs, SVOCs, pesticides, PCB aroclors, and metals) were detected above USEPA MCLs. While in limited cases the analytical laboratory did not achieve a laboratory quantitation limit below the USEPA MCL for SVOCs or PCBs, the available data collectively indicate that the analyzed constituents were either not detected or were detected at low levels below USEPA MCLs or USEPA Removal Management Levels (RMLs) for tap water.[20]

4.4.3 Soil

A "Phase III Soil Investigation" was conducted by Hart Engineers, Inc. between 1986 and 1987 to comply with requirements set forth in the 1985 AOC for a soil sampling program to determine the horizontal and vertical extent of contaminated soil surrounding active or inactive waste management/disposal units (USEPA, 1985). The sampling program was designed to sample material within each "worst case" unit within each category of waste unit type (e.g., drum burial landfills, immobilization facilities, etc.) based on known information regarding the age of the

[20] USEPA RMLs are calculated by USEPA based on a 10^{-4} risk level for carcinogens or a Hazard Quotient of 3 for non-carcinogens.

waste unit, condition of the waste unit, and types of wastes managed. The "worst case" data was designed to be used during preparation of closure plans, assuming conditions for every unit within a category were at worst equivalent to the worst conditions encountered.

The investigation included a series of test pits and soil borings advanced to evaluate horizontal and vertical extents of waste units and/or contaminated soil. Test pits were excavated at locations designed to be within waste unit interiors and around unit perimeters. Run-on and run-off test pits on upslope and downslope areas were also excavated and sampled to assess if contents of the four surface impoundments (Waste Units 7, 9, 13, and 17) had overflown the dikes and impacted surrounding areas. Run-off test pits were excavated along the dike's lowest topographic points. Surface samples were collected from units that were used for surface storage of drums (Hart Engineers, Inc., 1988). This event represents the only soil investigation event known to have been completed at PROTECO. Sample locations are illustrated on **Figure 20.**

The soil samples were analyzed for varying suites of constituents depending on the waste type(s) reported to have been managed within the corresponding waste unit. Generally, the analyses included VOCs, 8 RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), phenols, pesticides, total petroleum hydrocarbons (TPH), fluoride, cyanide, and/or sulfide. Some soil samples analyzed for RCRA metals were also prepared using the Extraction Procedure Toxicity (EP Tox) method which was used in place of TCLP at the time.[21] Three background soil samples (BG-1 through BG-3) were also analyzed in areas identified to be near waste units but "undisturbed by the facility or other activities" (Hart Engineers, Inc. 1988).

Within Waste Units 4, 7, and 9 where excavation of waste and/or underlying soil is reported as having been conducted, post-excavation confirmatory soil samples were collected from excavation bottom and/or sidewalls (Law Environmental – Caribe, 1999b).

4.4.3.1 Analytical Results

Maximum concentrations from soil samples collected in various waste units reported during the Phase III Soil Investigation are presented on **Figure 21** and **Table 8**. Results are reported by analytical suite where the highest total concentration per analytical suite is reported.

The highest organic concentrations were observed within samples collected from Waste Units 11 and 16 (immobilization facilities), Waste Unit 14 (reported non-hazardous land treatment area), Waste Unit 4 (above-ground drum and container storage area), Waste Unit 9 (oil lagoon), and Waste Unit 1 (drum burial landfill). The highest RCRA metals concentrations were observed within Waste Unit 6 (reported non-hazardous, sanitary landfill) and Waste Unit 4 (above-ground drum and container storage area).

Limited soil impacts and/or lateral contaminant migration of less than 10 feet was reported by Hart Engineers, Inc. from waste units used for drum burial, drum storage, container storage, or above-

[21] In 1990, USEPA adopted the TCLP to replace the EP Tox method.

ground tanks (Waste Units 1, 2, 3, 4, 5, 8, 15, and 19), immobilization facilities (Waste Units 10, 11, and 16), landfills and land treatment areas (Waste Units 6, 12, and 14).[22]

Soil impacts associated with liquid migration from liquid-containing Waste Units 7, 9, 13, 17 was reported. Hart Engineers, Inc. reported that "limited" liquid migration occurred from Waste Unit 17, while liquid migration from Waste Units 9 (oil lagoon) and 13 (rainwater basin) was limited to distances of 50 feet. They also reported that liquid migration led to impacts from Waste Unit 7 (neutralization impoundment) a distance of 250 feet away. The soil samples collected from Waste Unit 7 and 13 displayed lower concentrations compared to Waste Unit 9 (**Table 8**). Clastic deposits and gypsum veins within the Calcareous Silty Clay of Waste Unit 9 were identified as the most significant route of migration from this unit, with oily liquid encountered within clastic zones during soil sampling.

Post-excavation sampling results from Waste Units 4 and 7 during closure activities are reported to have demonstrated that "clean closure" was achieved for these units. The USEPA Region III RBCs for soil ingestion in an industrial scenario along with other characteristic toxicity and Site background-based values were proposed as Corrective Action Goals for Waste Units 4, 7, and 9 excavations (OHM, 1996b).[23] However, background sampling results were not reported in the *Closure Certification Document*. Concentrations of various VOCs were detected within post-excavation samples collected from Unit 9 prior to CAMU construction (Law Environmental – Caribe, 1999b).

4.5 Data Gaps

The RI scope will be developed to address preliminary data gaps identified in this section Additional data gaps may be discovered as addressed in the RI based on further document reviews.

4.5.1 Data Gaps Associated with Waste Units, Waste Management/Disposal, and/or Closure Systems

- Current condition of the CAMU, cover systems installed at other waste units, and other components of closure systems including the leachate collection system;
- Historical waste units' exact locations and extents, including the potential for waste disposal areas not identified in historical records;[24]

[22] A Waste Unit 19 identified as a drum storage area is discussed in the Phase III Soil Investigation report. Details of historic unit operations were not identified in reviewed reports.

[23] PROTECO proposed to collect background samples and establish Corrective Action Goals for constituents for which USEPA Region III RBCs were not developed. Corrective Action Goals were to be within two standard deviations of background levels (OHM, 1996b).

[24] The *Phase III Soils Investigation Report* references a Waste Unit 19 (Hart Engineers, Inc., 1988). Records reviewed to date do not provide operational details of Waste Unit 19 or discuss if a Waste Unit 18 may have been operated at the Site. The RI scope may include additional investigation to assess unit perimeters and/or areas outside of waste units to verify the footprints of certain waste units. Otherwise, the exact locations and extents of waste units may not be possible to determine beyond the information synthesized by Geosyntec and presented in the SPTM in the absence of additional supporting documents.

- Specific waste materials disposed in each unit (i.e., hazardous material management or disposal within reported non-hazardous units) that may contribute to impacts not evident within results of existing soil sampling; and
- Details of closure activities conducted at waste units.

4.5.2 Data Gaps Associated with Landfill Leachate, Groundwater, and Surface water

- Groundwater quality conditions post-1994;
- Detailed hydrogeologic characterization (groundwater flow direction, hydrogeologic characteristics, hydraulic connection between units);
- Background groundwater quality for different water-bearing units since certain units were sampled with limited wells, analytical suites, and/or frequency;
- Leachate generation (composition, generation rate, etc.);
- Magnitude and extent of potential surface water impacts; and
- Impacts of potential leachate run-off from adjacent EC Waste Landfill onto PROTECO Site over unknown time period.

4.5.3 Data Gaps Associated with Soil and Sediment

- Detailed lithological characterization of all geologic formations;
- Magnitude and extent of soil impacts within or beneath select waste units including units which were closed in-place without removal of soil/waste material (e.g., no interior soil sampling was completed within drum burial units Waste Units 1, 2, 3, 5 in the Phase III Soils Investigation);
- Potential liquid migration of contamination after the Phase III Soils Investigation that may have affected the magnitude and/or extent of soil impacts;
- Magnitude and extent of potential sediment impacts, including sediments generated from runoff at the facility accumulated in the sedimentation ponds to the south of the Site;
- Landfill gas information (composition, quantity, generation rate, etc.).

4.6 General Proposed Activities to Address Data Gaps

General activities required to address data gaps at the Site are presented below:

- Geologic investigations designed for greater spatial and vertical coverage, and for detailed lithological and structural characterization of all geologic formations and hydrogeologic units to capture heterogeneities within formations that may affect contaminant migration;
- Subsurface investigation to evaluate waste unit extents in areas not well characterized or delineated based on the historical record review;
- Installation of a groundwater monitoring well network designed for greater spatial coverage and characterization of each hydrogeologic unit;

- Hydrogeologic investigation to better define Site hydrogeologic characteristics including groundwater elevations, flow direction and gradients, hydraulic conductivity, aquifer performance, and hydraulic connection between water-bearing units; and
- Analytical sampling to evaluate the magnitude and extent of impacted media and collect data to support human health and ecological risk assessments.

5. PRELIMINARY SITE BOUNDARY AND SITE SECURITY

An initial approximation of the PROTECO Site boundary was defined in the 2019 *HRS Report* as the "PROTECO-Controlled Area" (Weston). The *HRS Report* did not include survey data or certified plans indicating the location of the approximate Site boundary shown in the report, nor did it provide a source or methodology for the boundary delineation.

In accordance with the USEPA SOW established in the AOC, a boundary survey was performed in February 2022 by a Puerto Rico licensed surveyor under the direction and supervision of Geosyntec. The purpose of this survey was to define an initial area for the RI and establish boundaries to avoid encroachment onto neighboring properties during the RI or remedial measures without appropriate authorization. The updated preliminary Site boundary is shown on **Figure 2** and has been demarcated as the former operational area of the PROTECO facility based on Geosyntec's review of historical reports, maps and aerial photographs from the Site, and identification of existing barbed wire fence in the field.[25] The current enclosed area of the Site encompasses approximately 44.5 acres.

A certified survey base map of the PROTECO fenced area is included in **Attachment D**. The coordinate system used is North American Datum of 1983 (NAD83) CONUS, and the vertical datum is the Puerto Rico Vertical Datum of 2002 (PRVD02).

Repairs to the existing barbed wire fence and gates enclosing the Site were completed between February and April 2022 as part of the improvements to Site security and access control. Other improvements include the installation of a new gate and new fencing near the west-central area of the Site and the construction and installation of four high-visibility signs at the Site in April 2021 aimed at informing the public or potential trespassers that access to the Site is prohibited. Photographs of the Site fence and access control features are included in **Attachment E**.

[25] Historical survey and georeferenced aerial photography information suggest that certain portions of Waste Units 4, 5, and 6 might extend outside of the PROTECO-controlled fenced area depicted on **Figure 2**, as described in **Section 4.1**.

6. PRELIMINARY CONCEPTUAL SITE MODEL

This section summarizes the preliminary understanding of the CSM, including the sources of contamination, potential release mechanisms, potential routes of migration, and potential human and ecological receptors. This information has been gathered through review of historical Site documents, review of ecological resources, and multiple Site visits completed between 2020 and 2022. The information from the CSM will be used to assess on-Site and off-Site environmental impacts and risks to human health and ecological receptors.

6.1 Potential Health and Environmental Concerns

Although the Site is currently not operational and has been abandoned, it is possible for humans to access the Site, which presents the potential for humans to come into contact with impacted or potentially impacted media. The Site is surrounded by barbed wire fence and a gate, however, access is still possible and livestock are able to enter the property.

Environmental concerns include potential impacts to ecological receptors. The USFWS Information for Planning and Consultation (IPaC) tool was used to identify threatened or endangered (T&E) species that may be present at the Site and within 0.5 miles of the Site. One endangered bird (Puerto Rican Nightjar), one endangered reptile (Puerto Rico Boa), three endangered plants (Bariaco, Eugenia woodburyana, Vahl's Boxwood) and one threatened plant (Varronia rupicola) were identified within the search area. Biological surveys were completed during a 6-week period between February and April 2022. During these surveys, one Puerto Rican Nightjar and one Eugenia Woodburyana were identified on-Site. The Puerto Rico Boa was not identified during any of the surveying activities.

6.2 Sources of Potential Contamination, Potential Release Mechanisms, Migration, and Impacted Media

The primary sources of potential contamination at the Site are the former waste units. Hazardous substances associated with various waste units are discussed in **Section 4.2**. No waste units are currently operational and closure activities were generally completed at the Site, however, the type of closure varied by unit and waste was closed in place in some units. Closure activities within some waste units included excavation or other removal of wastes, placement of composited wastes from multiple units installed into the constructed CAMU and capping via a final cover system (**Section 4.3**). The waste units that were capped have a 2-foot thick, low-permeability soil cap. With the exception of the CAMU, no other waste units are lined.

Surface soil (0 to 0.5 ft BLS), subsurface soil (0.5 to 4 ft BLS), and groundwater are the primary media identified as potentially impacted at the Site. Shallow groundwater at the Site is not a drinking water source. The depth of deeper groundwater within the Reef Limestone is variable but occurs on average at the Site at a depth of 200 ft BLS and available data does not indicate it is used as a drinking water source by off-Site residents.

The primary release mechanisms associated with former waste units include transport of surface soil by wind or in overland runoff and leaching from soil to groundwater. Since the waste units have caps in place, overland flow is unlikely to be a significant contributing transport mechanism. During the May 3, 2022 Site visit, erosion was visible around non-waste unit areas of the Site and also near the area of Waste Units 5, 7 and 9.

Although drainage channels are present at the Site, surface water is only present in these pathways during heavy rainfall and flow is intermittent. If standing surface water is present during the RI/FS sampling efforts, then surface water and sediment will also be evaluated. The drainage channels do provide a pathway for off-site migration, as discussed in **Section 3.1**.

6.3 Potential Human Receptors and Exposure Routes

Current human potential receptors include the following:

- Off-Site residents (adult and child)
- Off-Site workers
- Off-Site recreators
- On-Site trespassers (adult and youth), and
- On-Site industrial workers (adult).

Future human potential receptors include the following:

- Off-Site residents (adult and child)
- Off-Site workers
- Off-Site recreators
- On-Site trespassers (adult and youth)
- On-Site industrial workers (adult), and
- On-Site construction work (adult)

An exposure route is the way in which a chemical enters a human or organism upon contact. Complete exposure routes associated with receptor populations include incidental ingestion, dermal contact, and inhalation of particulates and volatile chemicals.

6.4 Potential Ecological Receptors and Exposure Routes

Current On-Site potential ecological receptors include the following:

- Terrestrial birds and mammals
- Terrestrial plants
- Terrestrial invertebrates

Based on observations made during the Site visit conducted on May 3, 2022, no permanent aquatic habitats exist at the Site. Although drainage features exist, these provide intermittent flow during heavy rain events and do not provide sufficient habitat for aquatic species. Therefore, on-Site aquatic plants, aquatic and benthic organisms, and aquatic-dependent birds and mammals will not be evaluated. However, since wetlands (estuarine and freshwater emergent) are located downgradient and within three (3) miles of the Site (**Figure 8**), off-Site freshwater and marine aquatic receptors may potentially be evaluated.

Potential exposure to ecological receptors occurs through incidental ingestion of media, dermal contact, and/or ingestion of prey that have ingested impacted media.

7. PRELIMINARY REMEDIAL ACTION OBJECTIVES

This section identifies preliminary RAOs as well as a preliminary list of general response actions and associated technologies that may be considered for the Site as warranted by RI data.

7.1 Preliminary Remedial Action Objectives

The preliminary RAOs are general descriptions of what remedial action is expected to accomplish and are aimed at protecting human health and the environment. Preliminary RAOs are presented below:

- Prevent direct contact with and ingestion of contaminated soil and waste materials;
- Prevent ingestion and dermal adsorption of groundwater and landfill leachate;
- Prevent migration of groundwater and leachate to surface waters;
- Prevent ingestion and adsorption of surface water and bioconcentration of contaminants from surface water;
- Prevent ingestion and adsorption of sediment and bioconcentration of contaminants from sediment; and
- Prevent inhalation and explosion of landfill gas.

7.2 General Response Actions

Anticipated general response actions may include one or more of the following actions. This list was developed in accordance with USEPA guidance *Conducting Remedial Investigation/Feasibility Studies for CERCLA Municipal Landfill Sites* (1991).

- Repair or replacement of existing CAMU or other cover systems so that they meet their performance criteria and provide effective source control;
- Containment, treatment, and/or removal of impacted soil and/or waste material (e.g., hot spot excavation);
- Control and treatment of impacted groundwater and landfill leachate;
- Collection and treatment of landfill gas;
- Treatment and/or removal of impacted sediment if present; and/or
- Treatment of impacted surface water if present.

Specific response action alternatives will be evaluated during the FS based on supplemental data collected during the RI.

7.3 Associated Technologies

Based on the absence of current chemical data from the Site, there is insufficient information to project viable treatment technologies at this juncture. The RI will provide supplemental information to inform the FS. Based on the limited data collected to date at the Site, some potential

remediation technologies associated with the general response actions contemplated for the Site may include the following:

- Containment/capping
- Soil and/or sediment excavation
- Hydraulic containment or treatment
- Institutional and engineering controls

If data indicates contamination poses an immediate threat to human health or the environment, an interim remedial measure will be considered. Alternatives will be evaluated in the FS against CERCLA evaluation criteria including protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, reduction in toxicity, mobility, and volume through treatment, short-term effectiveness, implementability, cost, state acceptance, and community acceptance.

8. POTENTIAL APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d) of CERCLA requires that on-site remedial actions attain or waive federal or state environmental ARARs to assure an implemented remedy is protective of human health and the environment. ARARs are defined as cleanup standards, standards of control, or other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that are deemed either "applicable" or "relevant and appropriate" to a CERCLA site. ARARs are designated as "applicable" to a site where the requirement specifically addresses a hazardous substance, pollutant, remedial action, location, or other circumstance at the site. If a requirement is not directly applicable to the site, it may still be deemed "relevant and appropriate" if it addresses a problem or situation sufficiently similar to those encountered at the site that its application is determined to be well-suited to the Site.

In addition to identification of ARARs, requirements can be identified as "To Be Considered" (TBC). TBCs are non-legally binding advisories or guidance issued by federal or state governments. ARARs and TBCs are considered during risk assessment and used in determining the necessary level of cleanup for protection of human health and the environment during the RI/FS process. ARARs are grouped into chemical-specific, location-specific, and action-specific requirements.

Potential ARARs were developed for the Site based on background, historical operations, and available data.[26] **Tables 9A** and **9B** present potential and preliminary chemical-specific and location-specific ARARs and TBCs. **Table 9C** presents example action-specific ARARs applicable for a limited number of general response actions that may or may not be appropriate for the Site. ARARs were developed based on the *CERCLA Compliance with Other Laws Manual* (USEPA, 1988). ARARs will be refined as part of the RI/FS.

All ARARs in **Tables 9A** through **9C** are preliminary and represent potential or example ARARs only. ARARs may be added, removed from consideration, or modified throughout the project as new or additional information and data are available and as approved by USEPA.

[26] Potential ARARs were developed based on review of records within the *HRS Report* (Weston, 2019); data contained within documents received after January 1, 2021 are not incorporated. ARARs may be modified as data are available and reviewed.

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Weston. 2018. *Removal Assessment Sampling Report, Revision 3, PROTECO Site (Off-Site Wells), Peñuelas, Puerto Rico*. Removal Support Team 3. August.

Weston. 2019. *Hazard Ranking System Documentation Record.* May.

TABLES

Table 1
Summary of Waste Units
PROTECO Superfund Site
Peñuelas, Puerto Rico

Waste Unit No.	Operational Years	General Description[A]	Waste Unit Alias[A]	Surface Area (ft^2)	Depth (feet)	Waste Volume	USEPA Waste Code Designations	Reported Use as Hazardous or Non-Hazardous Waste Unit[E]	General Waste Types	Historical Operational Method / Observations
1	1975 to 1979[A]	Drum burial landfill	Cavidad 1C	13,504[E]	15 to 18[A]	5,757 drums; 316,635 gallons[A]	D001, D002, D008, D009, D054, F001, F002, F003, F005, F006, K046, P012, U002, U044, U108, U112, U113, U117, U122, U134, U144, U154, U162, U188, U210, U211, U220, U225, U226[A, E]	Hazardous	Ignitable, corrosive, heavy metals, halogenated and non-halogenated solvents, electroplating, and variety of discarded commercial chemical products, off-specification species, container residues, or spill residues	Drums were buried in these landfills that were constructed in low permeability clay formations without liner systems[A]
2	1976 to 1979[A]	Drum burial landfill	General Electric	2,614[E]	10[A]	416 drums; 22,800 gallons[A]				
3	1977 to 1979[A]	Drum burial landfill	Roche	11,326[E]	10[A]	1,683 drums; 92,565 gallons[A]				
4	1975 to 1994[F]	Aboveground drum and container storage	DE	11,000[A]	N/A (surface storage)	1,000 drums; 55,000 gallons[F]	D001, D002, D007, D008, D009, F001, F002, F003, F005, F007, U002, U019, U040, U044, U080, U112, U122, U138, U144, U154, U188, U210, U220, U226, U228, U239[A, E]	Hazardous	Ignitable, corrosive, heavy metals, halogenated and non-halogenated solvents, cyanide, electroplating, and variety of discarded commercial chemical products, off-specification species, container residues, or spill residues	Drums were staged on wooden pallets over bare soil within an earthen-berm secondary containment system around the storage area to contain discharge and prevent run-on. Contaminated soil due to spills was excavated based on visual inspection of soil staining[A]
5	1975 to 1980[A]	Drum burial landfill	Searle	8,712[E]	5[F]	Full extent unknown[E]; 720 drums (reported)[A]	Full extent unknown[E]; D002 (reported)[A]	Hazardous	Corrosive (reported)[A]	See description for Waste Units 1 to 3[A]
6	1975 to 1999[F]	Sanitary landfill	SL	Not reported	Not reported	Detailed records not kept[A]	Detailed records not kept[A]	Non-hazardous[+]	- Wide variety of non-hazardous wastes; detailed records not available except for 16,000 cubic yards of non-hazardous power plant sludge; non-hazardous wastewater treatment sludge from tuna fish processing; 6,888 pounds of asbestos brake lining; electroplating sludge; metals slurry; and intravenous solution[A] - Additionally, small quantity generator (SQG) hazardous wastes[A]	Detailed operating records were not reported[A]
7	1975 to 1980[F]	Neutralization impoundment	LC	4,500[A]	5[A]	393,000 gallons (max capacity)[A]	Not reported	Hazardous	Received corrosive and unlisted wastes; contained aqueous solution of salts and metals, including ferric chloride, acids and bases added of pH adjustments[A]	Lagoon constructed in low permeability clay formation without a liner system and using earthen berms. Maintained at least 2 feet of freeboard in lagoon through evaporation of liquids. Neutralized pH of wastes by adding acids or bases, as necessary[A]
8	1975 to 1980[A]	Drum burial landfill	Loctite	Not reported	Not reported	240 drums (reported)[A]	D002 (reported)[A, F]	Non-hazardous[+]	Corrosive (reported)[A, F]; received asbestos material[G]; 500 empty drums observed in November 1985 in area directly above landfill with residual liquid and sludge with some visual evidence of releases to ground surface[D]	See description for Waste Units 1 to 3[A]
9	1975 to 1985[F]	Oil lagoon	LA	16,000[A]	4[C]	1,210,000 gallons[A]	D001[A] but others could have been present including D002, D005, D007, D008, D009, D010, D013, U106, U108, F001, F002, U154, U188, U196, U210, U220, U226, U230, and U239[F]	Hazardous	Ignitable[A]; others could include corrosive, heavy metals, lindane; halogenated solvents, and variety of discarded commercial chemical products, off-specification species, container residues, or spill residues[F]	Lagoon constructed in low permeability clay formation without a liner system and using earthen berms. Maintained at least 2 feet of freeboard in lagoon through evaporation of liquids or pumping nonhazardous water to rainwater basin (Waste Unit 13). Hazardous water was treated at immobilization facility. Nonhazardous sludge land farmed on-Site and hazardous sludge immobilized and disposed off-Site[A]
10	1975 to 1981[A]	Immobilization facility	TI_1	1,100[A]	14[A]	15,965 gallons[A]	D008, D009, F001[1]; full extent unknown[F]	Hazardous	Heavy metals and halogenated solvents (reported)[A]	See description for Waste Unit 16[A]
11	1975 to 1982[A]	Immobilization facility	TI_2	6,400[A]	28[A]	201,450 gallons[A]	D001, D002, D008, D009, D013, F001, F002, F006, F009, U044, U138, U140, U144, U151, U154, U156, U188, U201, U210, U226, and U239[A, F]	Hazardous	Ignitable, corrosive, heavy metal, lindane, halogenated solvents, electroplating, and variety of discarded commercial chemical products, off-specification species, container residues, or spill residues	
12	1976 to 1982[A]	Land treatment area	AC_1	130,680[F]	15[G]	149,435 gallons[A]	D001[1], D002, D013, and F003[F]	Hazardous	Ignitable[A], corrosive, lindane, non-halogenated solvents[F]	Liquids applied to surface soils for native biodegradation of waste. Biodegradation had not been demonstrated on-Site.[A]
13	1975 to 1999[F]	Rainwater basin	LB	Not reported	Not reported	100,000 gallons[F]	Same as Waste Unit 9[A]	Hazardous	Same as Waste Unit 9[A]	Lagoon constructed in low permeability clay formation without a liner system and using earthen berms. Maintained at least 2 feet of freeboard in lagoon through evaporation of liquids. Holding basin for nonhazardous water specifically pumped from Waste Unit 9[A]

Table 1
Summary of Waste Units
PROTECO Superfund Site
Peñuelas, Puerto Rico

Waste Unit No.	Operational Years	General Description[A]	Waste Unit Alias[A]	Surface Area (ft^2)	Depth (feet)	Waste Volume	USEPA Waste Code Designations	Reported Use as Hazardous or Non-Hazardous Waste Unit[E]	General Waste Types	Historical Operational Method / Observations
14	1975 to 1999[F]	Land treatment area	AC_2	435,600[G]	Not reported	Not reported	Not reported	Non-hazardous[+]	Operated as land farm for sludges and non-hazardous industrial solid waste landfill for asbestos, inorganic salts, waste motor oils, hydrocarbon-contaminated soils, demolition debris, food products, consumer/household products, solid waste from pharmaceutical and other industries, putrescible wastes from USDA inspections, grease and oils from cafes/restaurants, and liquid wastes including organic dextrose solutions and sera, industrial sludges, metallic sludges, publicly owned treatment works sludges, wastewater treatment plant sludges, and septic tank sludges[G]; presence of hazardous materials detected prior to closure[F]	Sludges applied to surface soils for native biodegradation of waste[A]
15	1975 to 1983[A]	Tank storage area	Not reported	N/A (AST)	N/A (AST)	8,000 gallons[A]	D013[A]	Hazardous	Lindane[A]	Lindane wastewater was stored in one aboveground storage tank that was surrounded by a secondary containment berm capable of holding 100 percent of the tank contents[A]
16	1975 to 1999[F]	Immobilization facility	TI_3	11,280[B]	11 to 20[A]	1,620,000 gallons[A]	D001, D002, D004, D006, D007, D008, D009, D010, D011, D013, F001, F002, F003, F005, F006, F007, F018, K050, K051, K052, K062, P030, P098, U002, U019, U021, U044, U080, U112, U122, U138, U144, U151, U154, U159, U188, U196, U201, U210, U220, U223, U226, U228, U230, and U239[A, F]	Hazardous	Ignitable, corrosive, heavy metal, lindane, halogenated and non-halogenated solvents, electroplating, petroleum refinery, cyanide wastes, and variety of discarded commercial chemical products, off-specification species, container residues, or spill residues	Landfill constructed in low permeability clay formation without a liner system. Solid and liquid hazardous wastes were immobilized through excavator mixing with a cement kiln dust and water mixture in series of parallel trenches. After one layer of multiple parallel, solidified trenches was completed across the landfill surface, a 1-ft thick layer of soil was leveled and compacted over the solidified trenches and the process of trenching and immobilization repeated on the next layer[A]
17	1975 to 1985[F]	Neutralization impoundment	LF	39,000[A]	5[A]	30,200 gallons[F]	D002 with small quantities of D001 and D003[F]	Hazardous	Corrosive with small quantities of ignitable and reactive[F]	See description for Waste Unit 7[A]

Notes and Abbreviations:

1. [+] indicates waste unit is reported as being designed and operated as a non-hazardous unit, however, historic records suggest some amount of hazardous material during the Site's operational period was contained in the unit.
2. Waste volumes presented herein are as reported in the identified data sources. The reported waste volume may not be equal to a calculated volume derived from the reported unit surface area multiplied by reported unit depth.

AST - aboveground storage tank
N/A - not applicable
ft^2 - square feet
USEPA - United States Environmental Protection Agency

Data Sources:

A United States Environmental Protection Agency (USEPA), Region II. 1986. *RCRA Facility Assessment Preliminary Review Solid Waste Management Units at Proteccion Tecnica Ecologica (PROTECO), Inc.* Caribbean Facilities Section. Hazardous Waste Facilities.

B United States Environmental Protection Agency. 1986. *Evaluation of Proteccion Tecnica Ecologica (Proteco).* EPA-700/8-87-005, Hazardous Waste Groundwater Task Force.

C Clappin, Phil. 1992. *Site Visit at Proteco, Tallaboa, P.R.* Memorandum, Hazardous Waste Compliance Branch, United States Environmental Proteccion Agency, Region II.

D OHM Remediation Services Co. 1996. *Closure and Post Closure Care Plan for Waste Units 1, 2, 3, 5, 7, 9, 10, 11, 12, 13, 16, and 17: Proteccion Tecnica Ecologica, Inc.* "Norcross, GA.

E Law Environmental - Caribe. 1999. *Closure Certification Document for Proteco Landfill Closure.* Santurce, Puerto Rico.

F Commonwealth of Puerto Rico. 2005. *Site Reassessment Letter,* Proteccion Tecnica Ecologica, Inc. (PROTECO). Puerto Rico Environmental Quality Board. PRD000831487.

G Weston Solutions, Inc. 2019. *HRS Documentation Record, Revised.*

Table 2
Groundwater Quality Ranges
PROTECO Superfund Site
Peñuelas, Puerto Rico

Well Unit	Approximate Average Well Depth (ft BLS)	TDS (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Sodium (mg/L)	TOC (mg/L)	pH	Electrical Conductivity (µS/cm)	Salinity (ppt[2], ‰)
Shallow Alluvial Unit Wells	**0-20**	23,000-27,200	2,679-13,500	711-2,690	1,140-5,730	205	6.4-6.48	11,000	6.0
Calcareous Silty Clay (Principal Water Bearing Unit) Wells	**20-200**	31,100-45,300	9,164-25,200	1,533-7,597	2,500-9,600	0.84-108.75	5.69-9.69	25,000-74,000	16-37
Deep Lenticular Deposit Wells	**> 200**	3,970	751-1,600	267-311	342-360	3.8	8.0	2,730	2.0
Reef Limestone Wells	**> 200**	1,370	103-883	48-161	73-460	4.2-32.45	6.3-9.40	1,110-7,900	0.85-4.2

Notes and Abbreviations:

1. Table summarizes results from monitoring events between 1982 and 1994 from the below-listed data sources.
2. Salinity value reported in the February 1987 *Phase 1A Report* (Fred C. Hart Associates, Inc.) is reported to be in units of percentage. Based on information provided in the September 30, 1992 *Draft RFA Update* (CDM Federal Programs Corporation), units are interpreted to be parts per thousand.

NC - no criteria
ft BLS - feet below land surface
TDS - total dissolved solids
TOC - total organic carbon
mg/L - milligrams per liter
µS/cm - microsiemens per centimeter
ppt, ‰ - parts per thousand

Data Sources:

- Ertec Atlantic, Inc. 1983. Site Inspection and Evaluation of Services Cabareon Penuelas, Puerto Rico. Somerset, NJ.
- United States Environmental Protection Agency. 1986. Evaluation of Proteccion Tecnica Ecologica (Proteco). EPA-700/8-87-005, Hazardous Waste Groundwater Task Force.
- Fred C. Hart Associates, Inc. 1987. Phase IA Hydrogeologic Investigation Proteccion Tecnica Ecologica, Inc. (Proteco), Ponce, Puerto Rico. Volume 1. Pittsburgh, PA.
- CDM Federal Programs Corporation. 1992. Draft RFA Update. Proteccion Tecnica Ecologica (Proteco) Inc. Facility, Penuelas, Puerto Rico.
- United States Environmental Protection Agency. 1987. RCRA Compliance Sampling Inspection (CSI) (Final Report). Proteccion Tecnica Ecologica (Proteco). Road 385, Km. 3.5, Penuelas, Puerto Rico.
- OHM Remediation Services, Co. 1992. Proteccion Tecnica Ecologica (Proteco) Inc. Hydrogeologic Data Interpretation. Clermont, Florida.
- Proteco, 1988. 1st Monthly Wells Sampling Report. Ponce, Puerto Rico.
- Proteco, 1988. 2nd Monthly Wells Sampling Report. Ponce, Puerto Rico.
- Proteco, 1988. 3rd Monthly Wells Sampling Report. Ponce, Puerto Rico.
- Proteco, 1988. 2nd Quarter - 3rd Year GW Monitoring Results. Ponce, Puerto Rico.
- Proteco. 1988. 3rd Quarter - 3rd Year Groundwater Monitoring Results. Ponce, Puerto Rico.
- OHM Remediation Services, Co. 1994. Hydrologic Investigation Proteco Landfill Facility. Clermont, Florida.

Table 3
Hazardous Waste Code Designations
PROTECO Superfund Site
Peñuelas, Puerto Rico

USEPA Hazardous Waste Code Designation	Hazardous Waste Type	Waste Unit No.
D001	Ignitable	1, 2, 3, 4, 9, 11, 12, 16, 17
D002	Corrosive	1, 2, 3, 4, 5, 8, 9, 11, 12, 16, 17
D003	Reactive	17
D004	Wastes with metals including arsenic	16
D005	Wastes with metals including barium	9
D006	Wastes with metals including cadmium	16
D007	Wastes with metals including chromium	4, 9, 16
D008	Wastes with metals including lead	1, 2, 3, 4, 9, 10, 11, 16
D009	Wastes with metals including mercury	1, 2, 3, 4, 9, 10, 11, 16
D010	Wastes with metals including selenium	9, 16
D011	Wastes with metals including silver	16
D013	Wastes containing lindane	9, 11, 12, 16
F001	Halogenated solvents	1, 2, 3, 4, 9, 10, 11, 16
F002		4, 9, 11, 16
F003	Non-halogenated solvents	1, 2, 3, 4, 12, 16
F005		1, 2, 3, 9, 16
F006	WWTP sludge from electroplating	1, 2, 3, 11, 16
F007	Cyanide plating solution from electroplating	4, 16
F009	Stripping and cleaning solutions from electroplating	11
F018	WWTP sludge from industrial painting	16
K046	WWTP sludge from lead manufacturing	1, 2, 3
K050	Cleaning sludge from petroleum refinery	16
K051	API separator sludge from petroleum refinery	16
K052	Tank bottoms (leaded) from petroleum refinery	16
K062	Pickle liquor from steel finishing operations	16
P012	Arsenic trioxide	1, 2, 3
P030	Cyanides (soluble cyanide salts)	16
P098	Potassium cyanide	16
U002	Acetone	1, 2, 3, 4, 16
U019	Benzene	4, 16
U021	Benzidine	16
U040	Chlorodibromomethane	4
U044	Chloroform	1, 2, 3, 4, 11, 16
U080	Dichloromethane	4, 16
U106	2,6-dinitrotoluene	9
U108	1,4-Dioxane	1, 2, 3, 9
U112	Ethyl-acetate	1, 2, 3, 4, 16
U113	Ethyl-acrylate	1, 2, 3
U117	Ethyl-ether	1, 2, 3
U122	Formaldehyde	1, 2, 3, 4, 9, 16
U134	HF acid	1, 2, 3
U138	Idomethane	4, 11
U140	Isobutyl alcohol	11

Table 3
Hazardous Waste Code Designations
PROTECO Superfund Site
Peñuelas, Puerto Rico

USEPA Hazardous Waste Code Designation	Hazardous Waste Type	Waste Unit No.
U144	Lead acetate	1, 2, 3, 4, 11, 16
U151	Mercury	11, 16
U154	Methanol	1, 2, 3, 4, 9, 11, 16
U156	Methyl chlorocarbonate	11
U159	2-butanone	16
U162	Methyl methacrylate	1, 2, 3
U188	Phenol	1, 2, 3, 4, 9, 11, 16
U196	Pyridine	9, 16
U201	1,3-benzenediol	11, 16
U210	Tetrachloroethylene	1, 2, 3, 4, 9, 11, 16
U211	Carbon tetrachloride	1, 2, 3
U220	Toluene	1, 2, 3, 4, 9, 16
U223	Toluene disocyanate	16
U225	Bromoform	1, 2, 3
U226	1,1,1-trichloroethane	1, 2, 3, 4, 9, 11, 16
U228	Trichloroethylene	4, 16
U230	2,4,5-trichlorophenol	9, 16
U239	Xylene	4, 9, 11

Notes and Abbreviations:

1. Waste codes are defined in 40 Code of Federal Regulations (CFR) Part 261 Subparts C and D.
2. Identification of waste units used to manage or dispose of individual waste types are based on the following sources:
   - United States Environmental Protection Agency (USEPA), Region II. 1986. *RCRA Facility Assessment Preliminary Review Solid Waste Management Units at Proteccion Tecnica Ecologica (PROTECO), Inc.*
   - Law Environmental - Caribe. 1999. *Closure Certification Document for Proteco Landfill Closure* . Santurce, Puerto Rico.
   - Commonwealth of Puerto Rico. 2005. *Site Reassessment Letter, Proteccion Tecnica Ecologica, Inc. (PROTECO).* Puerto Rico Environmental Quality Board. PRD000831487.
3. The *Closure Certification Document for Proteco Landfill Closure* (Law Environmental - Caribe, 1999) also identifies material with waste code D054 as dispose of in Waste Units 1, 2, and 3, however, this does not correspond to an existing USEPA hazardous waste code.

Table 4
Summary of Reported Waste Unit Closure and Post-Closure Activities
PROTECO Superfund Site
Peñuelas, Puerto Rico

Waste Unit No.	Closure Activity Timeline		Reported Closure Action	Post-Closure Confirmation Samples Collected?	Reported Post-Closure Action Observations/Notes
	Start[E]	Complete			
1	12/8/1997	6/24/1998[A]	No drum removal or installation of liner; capped with final cover system. Units 2 and 3 closed under the same final cover system.[A]	N/A - no waste removed during closure	- 06/13/17: observed to be overgrown with vegetation[D] - 12/13/17: after Hurricanes Irma and Maria, herbaceous vegetation observed to be intact and large trees remained standing with only bent or broken limbs; small trees were uprooted in some areas, resulting in voids in the soil[D]
2	12/12/1997	7/7/1998[A]		N/A - no waste removed during closure	- 08/23/99: rills and gullies observed ranging from 12 to 18 inches in depth[E] - 11/13/01: erosion problems observed[F] - 06/13/17: observed to be overgrown with vegetation[D] - 12/13/17: after Hurricanes Irma and Maria, herbaceous vegetation observed to be intact and large trees remained standing with only bent or broken limbs; small trees were uprooted in some areas, resulting in voids in the soil[D]
3	12/12/1997	7/7/1998[A]		N/A - no waste removed during closure	- 08/23/99: rills and gullies observed ranging from 12 to 18 inches in depth[E] - 11/13/01: erosion problems observed[F] - 12/13/17: after Hurricanes Irma and Maria, herbaceous vegetation observed to be intact and large trees remained standing with only bent or broken limbs; small trees were uprooted in some areas, resulting in voids in the soil[D]
4	11/11/1997	11/14/1997[A]	Removed 1,000 drums in 1994; excavated upper two feet and graded to provide positive drainage of stormwater; excavated material soil placed in CAMU[A]	Yes[A]	Not reported
5	12/5/1997	6/19/1998[A]	No drum removal or installation of liner; capped with final cover system[A]	N/A - no waste removed during closure	- 08/23/99:woody plants (less than 2 ft in height) observed growing on cover[E] - 11/13/01: no woody plants observed[F] - 12/13/17: after Hurricanes Irma and Maria, herbaceous vegetation observed to be intact and large trees remained standing with only bent or broken limbs; small trees were uprooted in some areas, resulting in voids in the soil[D]
6	Not Reported	1999 [G, +]	Wastes placed in Waste Unit 14[C, G]	No	Not reported
7	8/10/1998	8/17/1998[A]	Existing liquids allowed to evaporate; soil was excavated based on visual inspection of affected soils and graded to provide positive drainage of stormwater; excavated soil was placed in CAMU[A]	Yes[A]	Not reported
8	Not Reported	1999 [G, +]	Wastes placed in Waste Unit 14[C, G]	No	Not reported
9	9/26/1998	2/11/1999[A]	Soil added and mixed with liquid in 1994 to form solid matrix; soil was excavated and graded to provide positive drainage of stormwater; excavated soil was placed in CAMU[A]	Yes[A]. Samples exhibited detections of metals and VOCs. CAMU constructed atop the sampled soils.	- 08/23/99: woody plants (less than 2 ft in height) observed growing on cover; rills and gullies observed on northwest corner and east side of south transition slope[E] - 11/13/01: no woody plants observed[F]
10	9/26/1998	2/11/1999[A]	Closed in conjunction with CAMU under same continuous final cover system[A]	N/A - no waste removed during closure	Not reported
11					Not reported
12					- 08/23/99: perimeter ditch to east observed to be eroded and in need of repair near southernmost end; woody plants (less than 2 ft in height) observed growing on cover; rills and gullies observed on northwest corner and east side of south transition slope[E] - 11/13/01: perimeter ditch to east observed to be repaired; no woody plants observed[F]

Table 4
Summary of Reported Waste Unit Closure and Post-Closure Activities
PROTECO Superfund Site
Peñuelas, Puerto Rico

Waste Unit No.	Closure Activity Timeline		Reported Closure Action	Post-Closure Confirmation Samples Collected?	Reported Post-Closure Action Observations/Notes
	Start[E]	Complete			
13	8/6/1998	11/17/1998[A]	Closed under separate cover than CAMU; capped with final cover system[A]	N/A - no waste removed during closure	- 08/23/99: rills and gullies observed on sloped area adjacent to unit; ponding observed in perimeter ditch east of unit; woody plants (less than 2 ft in height) observed growing on cover[E] - 11/13/21: no ponding observed in perimeter ditch; no woody plants observed[F]
14	Not Reported	1999 [G, +]	Closed under separate cover than CAMU; capped with final cover system [A, G]	N/A - no waste removed during closure	Not reported
15	11/18/1997	1/14/1998[A]	Collected solids were removed from bottom of tank and placed in two 55-gallon drums; tank was degreased and pressure washed – the water and residue was collected and placed into 55-gallon drums; the contents of drums and the tank were disposed of at the PROTECO facilities industrial landfill; the 55-gallon drums were triple rinsed and recycled[A]	Yes[A] - aqueous samples collected from decontamination water and residue	Not reported
16	9/26/1998	2/11/1999[A]	Closed in conjunction with CAMU under same continuous final cover system[A]	N/A - no waste removed during closure	- 08/23/99: perimeter ditch to east observed to be eroded and in need of repair near southernmost end; woody plants (less than 2 ft in height) observed growing on cover; rills and gullies observed on northwest corner and east side of south transition slope[E] - 11/13/01: perimeter ditch to east observed to be repaired; no woody plants observed[F]
17	2/19/1998	7/28/1998[A]	Closed under separate cover than CAMU; capped with final cover system[A]	N/A - no waste removed during closure	- 08/23/99: woody plants (less than 2 ft in height) observed growing on cover; rills and gullies observed on northwest corner and east side of south transition slope[E] - 11/13/01: no woody plants observed[F]

Notes and Abbreviations:

1. Final cover system consists of the following (in ascending order): low permeability soil, geosynthetic clay, 40-millimeter high-density polyethylene (HDPE) flexible membrane, 16-ounce woven geotextile, 18 inches of common soil fill, and 12 inches aggregate.

2. Correction Action Management Unit (CAMU) consists of the following (in ascending order): 2 feet of low permeability soil, geosynthetic clay liner, 60-millimeter HDPE flexible membrane, waste from Units 4, 7, and 9, low permeability soil, geosynthetic clay, 40-millimeter HDPE flexible membrane, 16-ounce woven geotextile, 18 inches common soil fill, and 12 inches aggregate.

3. [+] indicates that specific dates of closure activities are not reported; closure date listed herein is the date of the earliest reviewed document stating that closure occurred (Waste Units 6 and 8) or was underway (Waste Unit 14). Details of closure activities, confirmation of waste removal, and/or documentation of USEPA closure approval have not been identified in reviewed records.

N/A - not applicable VOC - volatile organic compound

Data Sources:

A Law Environmental - Caribe. 1999a. *Closure Certification Document for Proteco Landfill Closure.* Santurce, Puerto Rico."

B Commonwealth of Puerto Rico. 2005. *Site Reassessment Letter,* Proteccion Tecnica Ecologica, Inc. (PROTECO). Puerto Rico Environmental Quality Board. PRD000831487.

C Weston Solutions, Inc. 2019. *HRS Documentation Record, Revised.*

D Weston Solutions, Inc. 2017. *Project Note: December 2017 Site Reconnaissance.*

E Law Environmental - Caribe. 2000. *Annual Inspection Report Fall 2000 for Closed RCRA Hazardous Waste Units* . Santurce, Puerto Rico.

F Law Environmental - Caribe. 2001. *2001 Annual Inspection Report RCRA Units Former PROTECO Facility* . Rio Piedras, Puerto Rico.

G Law Environmental - Caribe. 1999b. *Hazardous Waste Managemenet Unit Post-Closure Care Permit Application.* PROTECO. Peñuelas, Puerto Rico. July.

Table 5
Historical Monitoring Well Inventory
PROTECO Superfund Site
Peñuelas, Puerto Rico

Well ID	Installation Year	Unit (Descending Order)	Top of Screen (ft bls)	Bottom of Screen (ft bls)	Total Depth (ft bls)	TOC Elevation (ft*)	TOC Height Above Ground Surface (ft)	Elevation of Ground Surface (ft*)	Diameter (inches)	Material	Well Type
36WVS-86	1986[C]	Shallow Alluvial[C]	10.0[C]	20.0[C]	20.0[C]	291.75[C]	1.79[C]	289.96[C]	2.0[C]	PVC[C]	
77MWS-88	1988[§]	Shallow Alluvial[F]	NR	NR	NR	292.78[F]	NR	NR	NR	NR	
78MWS-88	1988[§]		NR	NR	NR	290.74[F]	NR	NR	NR	NR	
3W-81	1981[§]	Inferred to be Principal Water Bearing Unit[‡]	50.0[E]	80.0[E]	80.0[E]	295.50[E]	NR	NR	4.0[E]	PVC[E]	
4W / 4W-81	1981[§]		39.0[A]	53.0[A]	53.0[A]	342.71[E]	NR	NR	4.0[A]	PVC[B]	Background well[A]
9W / 9W-81	1981[§]		46.0[A]	56.0[A]	57.5[B]	335.86[E]	2.16	NR	4.0[A]	PVC[B]	
14W-85	1985[C]	Principal Water Bearing Unit[C]	32.5[B]	42.5[B]	43.8[B]	333.75[C]	1.13[C]	332.62[C]	2.0[B]	PVC[B]	
15W-85	1985[C]		48.0[B]	58.0[B]	59.4[B]	342.35[C]	0.94[C]	341.41[C]	2.0[B]	PVC[B]	
16W-85	1985[C]		131.3[C]	141.3[C]	141.3[C]	358.25[E]	NR	NR	2.0[C]	PVC[C]	
18W-85	1985[D]		49.5[B]	59.5[B]	59.5[B]	274.87[C]	1.16[C]	273.71[C]	2.0[B]	PVC[B]	
21W-85	1985[C]		47.6[B]	57.6[B]	57.7[B]	264.25[C]	0.73[C]	263.52[C]	2.0[B]	PVC[B]	
22W-85	1985[D]		45.0[B]	55.0[B]	55.0[B]	310.89[C]	1.54[C]	309.35[C]	2.0[B]	PVC[B]	Upgradient well[H]
23W-85	1985[D]		29.0[B]	39.0[B]	39.0[B]	282.33[C]	3.17[C]	279.16[C]	2.0[B]	Teflon[B]	
26W-85	1985[D]		59.0[B]	69.0[B]	69.0[B]	301.80[C]	1.73[C]	300.07[C]	2.0[B]	Teflon[B]	
28W-85	1985[D]		64.0[B]	74.0[B]	74.0[B]	299.30[C]	1.50[C]	297.80[C]	2.0[B]	PVC[B]	
29W-85	1985[D]		23.8[B]	33.8[B]	33.8[B]	302.04[C]	1.54[C]	300.50[C]	2.0[B]	Teflon[B]	
30W-85	1985[D]		44.0[B]	54.0[B]	54.0[B]	284.13[C]	1.69[C]	282.44[C]	2.0[B]	Teflon[B]	
32W-85	1985[C]		78.0[C]	88.0[C]	88.0[C]	360.97[C]	1.84[C]	359.13[C]	2.0[C]	PVC[C]	
36WS-86	1986[C]		41.0[C]	51.0[C]	51.0[C]	290.99[C]	1.80[C]	289.19[C]	2.0[C]	PVC[C]	
42WS-86	1986[C]		46.0[C]	56.0[C]	56.0[C]	358.33[C]	2.01[C]	356.32[C]	2.0[C]	PVC[C]	
43WS-86	1986[C]		47.0[C]	57.0[C]	57.0[C]	353.28[C]	3.35[C]	349.93[C]	2.0[C]	PVC[C]	Background well[C]
44WS-86	1986[C]		23.0[C]	33.0[C]	33.0[C]	353.15[C]	1.96[C]	351.19[C]	2.0[C]	PVC[C]	
48WS-86	1986[C]		40.0[C]	50.0[C]	50.0[C]	285.30[C]	1.69[C]	283.61[C]	2.0[C]	PVC[C]	Background well[C]
51WS-86	1986[C]		50.0[C]	60.0[C]	60.0[C]	335.20[C]	1.88[C]	333.32[C]	2.0[C]	PVC[C]	
54MWS-88	1988[§]	Principal Water Bearing Unit[F]	NR	NR	62.00[G]	345.88[F]	NR	NR	2.0[G]	NR	
55WS-88	1988[§]		NR	NR	48.51[G]	326.68[F]	NR	NR	2.0[G]	NR	
56MWS-88	1988[§]		NR	NR	52.54[G]	NR	NR	NR	2.0[G]	NR	
58MWS-88	1988[§]		NR	NR	44.00[G]	NR	NR	NR	2.0[G]	NR	
59MWS-88	1988[§]		NR	NR	56.00[G]	276.75[F]	NR	NR	2.0[G]	NR	

Table 5
Historical Monitoring Well Inventory
PROTECO Superfund Site
Peñuelas, Puerto Rico

Well ID	Installation Year	Unit (Descending Order)	Top of Screen (ft bls)	Bottom of Screen (ft bls)	Total Depth (ft bls)	TOC Elevation (ft*)	TOC Height Above Ground Surface (ft)	Elevation of Ground Surface (ft*)	Diameter (inches)	Material	Well Type
1W / 1W-81	1981[§]	Reef Limestone or Lenticular Deposit[F]	214.0[A]	229.0[A]	229.0[A]	268.54[E]	1.33	NR	2.0[B]	PVC[B]	
2W / 2W-81	1981[§]	Inferred to be Reef Limestone or Lenticular Deposit[‡]	230.0[A]	240.0[A]	240.0[A]	283.81[E]	0.80	NR	2.5[A]	PVC[E]	
11W-83	1983[§]		170[B]	193[B]	193.0[B]	348.53[E]	NR	NR	2.0[B]	PVC[B]	
12W-83	1983[§]		158.0[B]	168.0[B]	174.0[B]	287.17[E]	NR	NR	2.0[B]	PVC[B]	
27WD-86	1986[3]		171.5[C]	181.5[C]	181.5[C]	336.78[C]	2.31[C]	334.47[C]	2.0[C]	PVC[C]	
48WD-86	1986[C]	Reef Limestone[C]	244.5[C]	254.5[C]	254.5[C]	283.68[C]	2.08[C]	281.60[C]	2.0[C]	PVC[C]	
50WD-86	1986[C]		190.0[C]	200.0[C]	200.0[C]	312.45[C]	2.07[C]	310.38[C]	2.0[C]	PVC[C]	
51WD-86	1986[C]		202.1[C]	212.1[C]	212.1[C]	334.43[C]	1.50[C]	332.93[C]	2.0[C]	PVC[C]	
52WD-86	1986[C]		229.0[C]	239.0[C]	239.0[C]	400.06[C]	1.83[C]	398.23[C]	2.0[C]	PVC[B]	Background well[C]

Notes and Abbreviations:

1. ft* indicates surveyed vertical datum units not reported
2. ‡ indicates aquifer Unit is inferred based on screened interval, depth to water measurements, and/or lithologic boring logsC.

3. [§] indicates well installation year is inferred based on pattern with other reported well identifiers (e.g., ending with "…-86 indicates well constructed in 1986).

NR - not reported
PVC - polyvinyl chloride
TOC - top of casing
ft bls - feet below land surface

Data Sources:

A Ertec Atlantic, Inc. 1983. *Site Inspection and Evaluation of Services Cabareon Penuelas, Puerto Rico.* Somerset, NJ.

B United States Environmental Protection Agency, Region II. 1986. *Evaluation of Proteccion Tecnica Ecologica (Proteco), Penuelas, Puerto Rico.* EPA-700 / 8-87-005. Hazardous Waste Ground-Water Task Force.

C Fred C. Hart Associates, Inc. 1987. *Phase IA Hydrogeologic Investigation Proteccion Tecnica Ecologica, Inc. (Proteco), Ponce, Puerto Rico.* Volume 1. Pittsburgh, PA.

D Commonwealth of Puerto Rico Environmental Quality Board. 1989. *Proteccion Tecnica Ecologica's Comprehensive Monitoring Evaluation.* PRD091018622. Santurce, Puerto Rico.

E OHM Remediation Services, Co. 1992. *Proteccion Tecnica Ecologica (Proteco) Inc. Hydrogeologic Data Interpretation.* Clermont, Florida.

F OHM Remediation Services, Co. 1994. *Hydrologic Investigation Proteco Landfill Facility.* Clermont, Florida.

G Proteco, 1988. *1st Monthly Wells Sampling Report.*

H CDM Federal Programs Corporation. *Draft RFA Update* . Proteccion Tecnica Ecologica (Proteco) Inc. Facility, Penuelas, Puerto Rico.

Table 6
Summary of Historical Groundwater Sampling Events and Sampling Parameters
PROTECO Superfund Site
Peñuelas, Puerto Rico

Sampling Date	Number of Wells Sampled				Parameters Sampled / Detected				Data Source
	Shallow Alluvial Zone Wells (Depth Approx. 0-20 ft BLS)	**Principal Water Bearing Zone Wells** (Depth Approx. 20-200 ft BLS)	**Deep Lenticular Deposit Wells** (Depth Approx. > 200 ft BLS)	**Reef Limestone Wells** (Depth Approx. > 200 ft BLS)	**VOCs**	**Metals**	**Water Quality Parameters[4]**	**Additional Parameters**	
7/6/1982	-	2	-	2	-	x - Cadmium[1] data available only	x	Phenols[3]	A
2/22/1984	-	-	-	4	Bis(2-ethylhexyl) phthalate[1]	-	-	-	B
11/18/1985-11/24/1985	-	12	-	3	x[6]	Aluminum[2], Arsenic[1], Antimony[1], Barium[1], Cadmium[1], Chromium[1], Lead[1], Iron[2], Manganese[2,3]	-	SVOCs, Pesticides/ Herbicides, PCBs analyzed; Data rejected during QA/QC process and not reported	B
2/2/1986	-	7	-	-	-	Barium[1], Iron[2,3], Manganese[2,3]	x	-	C
5/5/1986	-	7	-	-	-	Cadmium[1], Lead[1], Iron[2,3], Manganese[2,3]	x	-	C
8/4/1986	-	7	-	-	x	Lead[1], Iron[2], Manganese[2,3]	x	-	D
8/21/1986 - 10/30/1986	1	4	-	1	-	Cadmium[1], Lead[1], Iron[2], Manganese[2,3]	x	-	C
11/6/1986	-	7	-	-	x	Mercury[1], Lead[1], Iron[2,3], Manganese[2,3]	x	-	D
2/3/1987	1	2	-	4	Multiple, including PCE[1], TCE[1], trans-1,2-DCE[1], 1,1-DCE[1], 1,2-DCA[1], VC[1], benzene[1], others.	x - Detections known, but data not legible	pH only	-	E
4/9/1987	-	7	-	-	x	Iron[2], Manganese[2,3]	x	-	D
8/7/1987	-	6	-	-	-	Iron[2], Manganese[2,3]	x	-	D

Table 6
Summary of Historical Groundwater Sampling Events and Sampling Parameters
PROTECO Superfund Site
Peñuelas, Puerto Rico

Sampling Date	Number of Wells Sampled				Parameters Sampled / Detected				Data Source
	Shallow Alluvial Zone Wells (Depth Approx. 0-20 ft BLS)	**Principal Water Bearing Zone Wells** (Depth Approx. 20-200 ft BLS)	**Deep Lenticular Deposit Wells** (Depth Approx. > 200 ft BLS)	**Reef Limestone Wells** (Depth Approx. > 200 ft BLS)	**VOCs**	**Metals**	**Water Quality Parameters[4]**	**Additional Parameters**	
1/29/1988	-	1	-	4	PCE[1], TCE[1], 1,1-DCE[1], trans-1,2-DCE[1], 1,1-DCA[3]	-	-	-	D, F
2/25/1988-2/26/1988	2	14	-	-	PCE[1], TCE[1], 1,1-DCE[1], trans-1,2-DCE[1], 1,2-DCA[1], MC[1]	Lead[1], Iron[2], Manganese[2,3]	x	Phenol, Coliforms, Radiologicals, Pesticides[5]	D, F, G
3/25/1988	-	6	-	-	PCE[1], TCE[1], 1,1-DCE[1], trans-1,2-DCE[1]	Iron[2], Manganese[2,3]	x	Phenol, Coliforms, Radiologicals, Pesticides[5]	D, H
4/28/1988	-	6	-	-	PCE[1], TCE[1], 1,1-DCE[1], trans-1,2-DCE[1]	Arsenic[1], Iron[2,3], Manganese[2,3]	x	Phenol, Coliforms, Radiologicals, Pesticides[5]	D, I
5/26/1988-5/27/1988	-	13	-	-	PCE[1], TCE[1], 1,1-DCE[1], trans-1,2-DCE[1], 1,2-DCA[1], 1,1-DCA[3]	Cadmium[1], Iron[2,3], Manganese[2,3]	x	Phenol, Coliforms, Radiologicals, Pesticides[5]	D, J
9/15/1988	-	7	-	-	MC[1]	Cadmium[1], Lead[1], Iron[2], Manganese[2,3]	x	Phenol, Coliforms, Radiologicals, Pesticides[5]	K
11/30/1988	-	7	-	-	MC[1]	Arsenic[1], Lead[1], Iron[2,3], Manganese[2,3]	x	-	D
3/7/1989	-	7	-	-	x	Iron[2], Manganese[2,3]	x	-	D
12/17/1990	-	7	-	-	MC[1]	Iron[2,3], Manganese[2,3]	x	-	D
7/1991	-	7	-	-	x	Iron[2,3], Manganese[2,3]	x	-	D
12/16/1991	-	7	-	-	x	Iron[2,3], Manganese[2,3]	x	-	D
5/16/1994	2	10	1	1	PCE[1], TCE[1], 1,2-DCA[1], 1,1-DCA[3]	-	x	-	L

Table 6
Summary of Historical Groundwater Sampling Events and Sampling Parameters
PROTECO Superfund Site
Peñuelas, Puerto Rico

Legend:

x	Analyte group was sampled
-	Analyte group was not sampled

Color Screening Legend:

(no color)	No parameter within analyte group was detected above laboratory detection limit
Yellow	One or more parameters within analyte group detected above laboratory detection limit
Orange	One or more parameters within analyte group detected above the (1) EPA Primary Drinking Water MCL; (2) EPA Secondary Drinking Water MCL; or (3) EPA Regional Screening Levels for Tap Water if an MCL or SMCL does not exist. Exceeding analyte(s) are listed.

Notes and Abbreviations:

Footnotes 1-3 refer to exceedances of screening criteria listed above.

[4.] Water quality parameters may include pH, TOC, TDS, salinity, specific conductivity, chloride, sulfate, sodium, etc.

[5.] Detection limits above EPA MCLs were reported for multiple pesticides.

[6.] According to information reported in the Evaluation of Proteccion Tecnica Ecologica (Proteco), EPA-700/8-87-005, Hazardous Waste Groundwater Task Force (United States EPA, 1986),

7. Color screening is included for VOCs and metals only. In general, exceedances of EPA Secondary Drinking Water Standards for chloride, sulfate, TDS, and/or other parameters

8. Monitoring wells 1W-81, 2W-81, 11W-83, and 12W-83 are included herein as Reef Limestone wells based on information presented in Table 5.

9. Summary is based on available data reports reviewed by Geosyntec listed below.

MCL - Maximum Contaminant Level (National Primary Drinking Water Standard)
SMCL - Secondary Maximum Contaminant Level (Secondary Drinking Water Standard)
VOC - volatile organic compound
SVOC - semi-volatile organic compound
TDS - total dissolved solids
TOC - total organic carbon
ft BLS - feet below land surface
QA/QC - quality assurance/quality control

PCE - tetrachloroethene
TCE - trichloroethene
DCE - dichloroethene
DCA - dichloroethane
VC - vinyl chloride
MC - methylene chloride
PCB - polychlorinated biphenyl

Data Sources:

A	Ertec Atlantic, Inc. 1983. Site Inspection and Evaluation of Services Cabareon Penuelas, Puerto Rico. Somerset, NJ.
B	United States Environmental Protection Agency. 1986. Evaluation of Proteccion Tecnica Ecologica (Proteco). EPA-700/8-87-005, Hazardous Waste Groundwater Task
C	Fred C. Hart Associates, Inc. 1987. Phase IA Hydrogeologic Investigation Proteccion Tecnica Ecologica, Inc. (Proteco), Ponce, Puerto Rico. Volume 1. Pittsburgh, PA.
D	CDM Federal Programs Corporation. Draft RFA Update. Proteccion Tecnica Ecologica (Proteco) Inc. Facility, Penuelas, Puerto Rico.
E	United States Environmental Protection Agency. 1987. RCRA Compliance Sampling Inspection (CSI) (Final Report). Proteccion Tecnica Ecologica (Proteco). Road 385,
F	OHM Remediation Services, Co. 1992. Proteccion Tecnica Ecologica (Proteco) Inc. Hydrogeologic Data Interpretation. Clermont, Florida.
G	Proteco, 1988. 1st Monthly Wells Sampling Report. Ponce, Puerto Rico.
H	Proteco, 1988. 2nd Monthly Wells Sampling Report. Ponce, Puerto Rico.
I	Proteco, 1988. 3rd Monthly Wells Sampling Report. Ponce, Puerto Rico.
J	Proteco, 1988. 2nd Quarter - 3rd Year GW Monitoring Results. Ponce, Puerto Rico.
K	Proteco. 1988. 3rd Quarter - 3rd Year Groundwater Monitoring Results. Ponce, Puerto Rico.
L	OHM Remediation Services, Co. 1994. Hydrologic Investigation Proteco Landfill Facility. Clermont, Florida.

Table 7A
Historical Groundwater Analytical Concentration Ranges - VOCs
PROTECO Superfund Site
Peñuelas, Puerto Rico

Well Unit	Approximate Average Well Depth (ft BLS)	PCE (µg/L)	TCE (µg/L)	1,1-DCA (µg/L)	1,2-DCA (µg/L)	1,1-DCE (µg/L)	VC (µg/L)	Benzene (µg/L)	1,1,1-TCA (µg/L)	trans-1,2-DCE (µg/L)	MC (µg/L)	di-n-butyl phthalate (µg/L)	Bis(2-ethylhexyl) phthalate (µg/L)
MCL		*5*	*5*	*NC*	*5*	*7*	*2*	*5*	*200*	*100*	*5*	*NC*	*6*
EPA Regional Screening Level - Tap Water		*NA*	*NA*	*2.8*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*900*	*NA*
Shallow Alluvial Unit Wells	**0-20**	**9-77**	**10-78**	**10-140**	**11-14,000**	**50-120**	**21**	**20-33**	34-110	11	**24-140**	**1,050**	--
Principal Water Bearing Unit Wells	**20-200**	**320-640**	**69-100**	**5-9**	**30-76**	**8-11**	--	5	1-5	**11-150**	**1-302**	320	--
Deep Lenticular Deposit Wells	**> 200**	--	--	--	--	--	--	--	--	--	--	--	--
Reef Limestone Wells	**> 200**	**970-2,400**	**250-270**	**3-640**	--	**230-680**	**230**	**40**	7.1-57	**230-860**	--	--	**3-350**

Notes and Abbreviations:

1. Sampling dates summarized include events presented in Table 6.
2. Screening criteria include (1) EPA Primary Drinking Water MCLs; and/or (2) EPA Regional Screening Levels for Tap Water if an MCL does not exist. For parameters for which MCLs are established, MCLs are used for screening criteria only.
3. **Bold and highlighted yellow text indicates an exceedance of one or more screening criteria within the listed range.**
4. -- indicates well(s) were not sampled for the listed parameter or no detections were identified in the reviewed documents.

DCA - dichloroethane
DCE - dichloroethene
EPA - Environmental Protection Agency
ft BLS - feet below land surface
MC - methylene chloride
MCL - Maximum Contaminant Level
µg/L - micrograms per liter
NA - not applicable
NC - no criteria
PCE - tetrachloroethene
TCA - trichloroethane
TCE - trichloroethene
VC - vinyl chloride
VOC - volatile organic compound

Data Sources:

A Ertec Atlantic, Inc. 1983. Site Inspection and Evaluation of Services Cabareon Penuelas, Puerto Rico. Somerset, NJ.
B United States Environmental Protection Agency. 1986. Evaluation of Proteccion Tecnica Ecologica (Proteco). EPA-700/8-87-005, Hazardous Waste Groundwater Task Force.
C Fred C. Hart Associates, Inc. 1987. Phase IA Hydrogeologic Investigation Proteccion Tecnica Ecologica, Inc. (Proteco), Ponce, Puerto Rico. Volume 1. Pittsburgh, PA.
D CDM Federal Programs Corporation. 1992. Draft RFA Update. Proteccion Tecnica Ecologica (Proteco) Inc. Facility, Penuelas, Puerto Rico.
E United States Environmental Protection Agency. 1987. RCRA Compliance Sampling Inspection (CSI) (Final Report). Proteccion Tecnica Ecologica (Proteco). Road 385, Km. 3.5, Penuelas, Puerto Rico.
F OHM Remediation Services, Co. 1992. Proteccion Tecnica Ecologica (Proteco) Inc. Hydrogeologic Data Interpretation. Clermont, Florida.
G Proteco, 1988. 1st Monthly Wells Sampling Report. Ponce, Puerto Rico.
H Proteco, 1988. 2nd Monthly Wells Sampling Report. Ponce, Puerto Rico.
I Proteco, 1988. 3rd Monthly Wells Sampling Report. Ponce, Puerto Rico.
J Proteco, 1988. 2nd Quarter - 3rd Year GW Monitoring Results. Ponce, Puerto Rico.
K Proteco. 1988. 3rd Quarter - 3rd Year Groundwater Monitoring Results. Ponce, Puerto Rico.
L OHM Remediation Services, Co. 1994. Hydrologic Investigation Proteco Landfill Facility. Clermont, Florida.

Table 7B
Historical Groundwater Analytical Concentration Ranges - Metals
PROTECO Superfund Site
Peñuelas, Puerto Rico

Well Unit	Approximate Average Well Depth (ft BLS)	Aluminum (µg/L)	Arsenic (µg/L)	Antimony (µg/L)	Barium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Lead (µg/L)	Iron (µg/L)	Manganese (µg/L)	Mercury (µg/L)
MCL		*NC*	*10*	*6*	*2,000*	*5*	*100*	*1,300**	*15**	*NC*	*NC*	*2*
SMCL		*50-200*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*300*	*50*	*NA*
EPA Regional Screening Level - Tap Water		*20,000*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*14,000*	*430*	*NA*
Shallow Alluvial Unit Wells	**0-20**	--	--	--	600	3	--	--	**39**	196	**1,850**	--
Principal Water Bearing Unit Wells	**20-200**	**449-421,000**	**2.3-24.1**	**124-582**	**200-2,700**	**2-120**	**3-666**	40-149	**5-1,040**	**27-129,960**	**39-3,149**	**0.2-3.95**
Deep Lenticular Deposit Wells	**> 200**	--	--	--	500	--	--	--	--	**460**	**250**	--
Reef Limestone Wells	**> 200**	**1,040-322,000**	--	**90-102**	100-600	**2-100**	21-83	650	**47-49**	**47-21,000**	**12-1,150**	1.8

Notes and Abbreviations:

1. Sampling dates summarized include events presented in Table 6.
2. Screening criteria include (1) EPA Primary Drinking Water MCLs; (2) EPA Secondary Drinking Water MCLs; and/or (3) EPA Regional Screening Levels for Tap Water if an MCL or SMCL does not exist. For parameters for which MCLs are established, MCLs are used for screening criteria only.
3. * indicates lead and copper are regulated by a treatment technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For copper, the action level is 1300 µg/L, and for lead is 15 µg/L.
4. Results from 11/1985 data set include negative values and data with multiple qualifiers including indicating that data is estimated, that spike sample recovery was not within control limits, or that values are greater than the detection limit of equipment. Data is included herein as reported in the November 1986 Hazardous Waste Groundwater Task Force Evaluation of Proteco (USEPA), with the exception of the omission of negative
5. -- indicates well(s) were not sampled for the listed parameter or no detections were identified in the reviewed documents.
6. **Bold and highlighted yellow text indicates an exceedance of one or more screening criteria within the listed range.**

EPA - Environmental Protection Agency
NA - not applicable
NC - no criteria
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
SMCL - Secondary Maximum Contaminant Level

Data Sources:

A Ertec Atlantic, Inc. 1983. Site Inspection and Evaluation of Services Cabareon Penuelas, Puerto Rico. Somerset, NJ.
B United States Environmental Protection Agency. 1986. Evaluation of Proteccion Tecnica Ecologica (Proteco). EPA-700/8-87-005, Hazardous Waste Groundwater Task Force.
C Fred C. Hart Associates, Inc. 1 - Fred C. Hart Associates, Inc. 1987. Phase IA Hydrogeologic Investigation Proteccion Tecnica Ecologica, Inc. (Proteco), Ponce, Puerto Rico. Volume 1. Pittsburgh, PA.
D CDM Federal Programs Corporation. 1992. Draft RFA Update. Proteccion Tecnica Ecologica (Proteco) Inc. Facility, Penuelas, Puerto Rico.
E United States Environmental Protection Agency. 1987. RCRA Compliance Sampling Inspection (CSI) (Final Report). Proteccion Tecnica Ecologica (Proteco). Road 385, Km. 3.5, Penuelas, Puerto Rico.
F OHM Remediation Services, Co. 1992. Proteccion Tecnica Ecologica (Proteco) Inc. Hydrogeologic Data Interpretation. Clermont, Florida.
G Proteco, 1988. 1st Monthly Wells Sampling Report. Ponce, Puerto Rico.
H Proteco, 1988. 2nd Monthly Wells Sampling Report. Ponce, Puerto Rico.
I Proteco, 1988. 3rd Monthly Wells Sampling Report. Ponce, Puerto Rico.
J Proteco, 1988. 2nd Quarter - 3rd Year GW Monitoring Results. Ponce, Puerto Rico.
K Proteco. 1988. 3rd Quarter - 3rd Year Groundwater Monitoring Results. Ponce, Puerto Rico.
L OHM Remediation Services, C - OHM Remediation Services, Co. 1994. Hydrologic Investigation Proteco Landfill Facility. Clermont, Florida.

Table 8
Maximum Historical Soil Concentrations - 1986 to 1987 Phase III Soil Investigation
PROTECO Superfund Site
Peñuelas, Puerto Rico

Compound	Units	Waste Unit																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Total SVOCs	µg/kg	3620	ND	ND	18000	ND	510	ND	240	9600	ND	43790	ND	ND	239300	ND	ND	ND
Total VOCs	µg/kg	8758	200	87	694	5	32	18	ND	1093	677	786000	47	139	462200	484	618500	20
Total Pesticides	µg/kg	ND	ND	ND	60.3	ND	ND	ND	ND	3.3	ND	309	4.7	ND	42400	34	12	ND
RCRA Metals	mg/kg	133	NA	NA	641	3.1	1200	180	190.9	NA	300	200	120	NA	NA	NA	225.8	294
Cyanide	mg/kg	NA	NA	NA	7.84	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH	mg/kg	NA	NA	NA	NA	NA	1380	NA	NA	NA	NA	434000	260	NA	13120	367	188	NA
Phenolics	mg/kg	NA	NA	NA	0.59	3	NA	NA	NA	13.7	NA	NA	NA	1.04	NA	0.351	NA	ND

Notes:
1. Reported concentrations represent the maximum detections from soil samples collected within each waste unit during the Phase III Soil Investigation (Hart Engineers, Inc., 1988). Where a sample was reported within the Phase III Soil Investigation Report as being collected from liquid contents of a drum, the result is not reported in this table.
2. RCRA metals include arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver.

Abbreviations:
NS - not specified
ND - not detected
NA - not analyzed for
SVOCs - semivolatile organic compounds
VOCs - volatile organic compounds
RCRA - Resource Conservation and Recovery Act
TPH - total petroleum hydrocarbons
µg/kg - microgram per kilogram

Table 9A
Potential Chemical-Specific ARARs
PROTECO Superfund Site
Peñuelas, Puerto Rico

Description	Citation	ARAR/TBC	Summary	Status
Groundwater/Surface Water				
National Primary Drinking Water Standards - MCLs	40 CFR 141.1 through 40 CFR 141.166	ARAR	Establishes numerical National Primary Drinking Water Standards pursuant to the Public Health Service Act, as amended by the Safe Drinking Water Act.	Applicable at point of complicance if groundwater is identified as a drinking water source
Puerto Rico Water Quality Standards Regulation	Department of Natural and Environmental Resources, Water Quality Standards Regulation No. 9079 (April 2019), Rule 1300	ARAR	Establishes numerical groundwater and surface water criteria and standards for discharge limitations for anti-degradation of waters of Puerto Rico.	Applicable if groundwater is identified as Class SG
National Secondary Drinking Water Standards - Secondary Standards	40 CFR Part 143 Subpart A	ARAR	Establishes numerical National Secondary Drinking Water Standards pursuant to the Safe Drinking Water Act to control contaminants in drinking water that primarily affect the aesthetic qualities relating to the public acceptance of drinking water. Secondary MCLs are not Federally enforceable but are intended as guidelines for the States.	Relevant and appropriate if groundwater is identified as a drinking water source
USEPA Regional Screening Levels for Residential Tap Water	www.epa.gov/risk/regional-screening-levels-rsls-generic-tables	TBC	Risk based generic screening levels for residential tap water to be considered in the development of site-specific remediation goals.	To be considered if groundwater is identified as drinking water source
NOAA Screening Quick Reference Tables	https://response.restoration.noaa.gov/environmental-restoration/environmental-assessment-tools/squirt-cards.html	TBC	Screening levels based on possible impacts to coastal resources and habitats potentially affected by hazardous waste sites, including freshwater and marine sediment, groundwater, surface water, and soil.	To be considered if habitat is present
USEPA Region 4 Ecological Risk Assessment - Surface Water Screening Values for Hazardous Waste Sites (USEPA Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018)	https://www.epa.gov/risk/regional-ecological-risk-assessment-era-supplemental-guidance	TBC	Ecological risk-based freshwater and saltwater surface water screening values	To be considered if habitat is present
Criteria and Standards for the NPDES	40 CFR 125.1 through 40 CFR 125.73	ARAR	Provides discharge criteria and standards for the NPDES program to protect human health and aquatic life in streams, lakes, and rivers	Applicable to any portion of a remedy that may generate wastewater requiring discharge
National Recommended Water Quality Criteria - Aquatic Life Criteria	https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table	TBC	Aquatic life ambient surface water quality criteria developed by EPA purusant to Section 304(a) of the Clean Water Act for states and tribes to consider. Criteria include freshwater and saltwater screening values (CMCs and CCCs) based on ecological risk assessment.	To be considered if habitat is present
National Recommended Water Quality Criteria - Human Health Criteria	https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table	TBC	Surface water screening criteria for human health for the consumption of water and organisms for states and tribes to consider when adopting criteria into water quality standards. Criteria developed by EPA purusant to Section 304(a) of the Clean Water Act.	To be considered if surface water is consumed or surface water organisms are consumed

Table 9A
Potential Chemical-Specific ARARs
PROTECO Superfund Site
Peñuelas, Puerto Rico

Description	Citation	ARAR/TBC	Summary	Status
National Recommended Water Quality Criteria - Organoleptic Effects	https://www.epa.gov/wqc/national-recommended-water-quality-criteria-organoleptic-effects	TBC	Surface water screening criteria for aquatic life and human health for states and tribes to consider when adopting criteria into water quality standards. Criteria developed by EPA purusant to Section 304(a) of the Clean Water Act.	To be considered if surface water is consumed or habitat is present
Soil/Sediment/Waste				
Identification and Listing of Hazardous Waste Subpart C – Characteristics of Hazardous Waste	40 CFR 261.20 through 40 CFR 261.24	ARAR	Citations identify ignitability, corrosivity, reactivity, and toxicity characteristics which define if a waste is hazardous.	Relevant and Appropriate if some of the Site soils and sediments may be hazardous and may need to be treated as hazardous wastes. Waste for offsite disposal would be managed and disposed of consistent with its characterization.
USEPA Region 4 Ecological Risk Assessment - Sediment Screening Values for Hazardous Waste Sites (USEPA Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018)	https://www.epa.gov/risk/regional-ecological-risk-assessment-era-supplemental-guidance	TBC	Ecological risk-based freshwater and marine/estuarine sediment screening values	To be considered if habitat is present
USEPA Region 4 Ecological Risk Assessment - Soil Screening Values for Hazardous Waste Sites (USEPA Region 4 Ecological Risk Assessment Supplemental Guidance, March 2018)	https://www.epa.gov/risk/regional-ecological-risk-assessment-era-supplemental-guidance	TBC	Ecological risk-based soil screening values based on receptor types (plants, soil invertebrates, mammalian, avian)	To be considered if habitat is present
USEPA Regional Screening Levels for Soil	https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables	TBC	Non-enforceable concentrations that are protective of human health under a given set of exposure circumstances (residential vs. Industrial). The RSLs provide soil concentrations that are associated with a cancer risk of 1E-06 or a non-cancer hazard quotient of 1 for a standard resident exposure (residential soil RSLs), industrial worker exposure (industrial soil RSLs), and for soil leachability to groundwater. Also provides toxicological information that can be used in the development of PRGs to protect human health.	To be considered if exposure pathways are identified

Notes and Abbreviations:
1. ARARs/TBCs are currently preliminary and represent potential ARARs/TBCs.

ARAR: applicable or relevant and appropriate requirement
CCC: Criterion Continuous Concentration
CCM: Criterion Maximum Concentration
CFR: Code of Federal Regulations
COCs: contaminants of concern
CTL: cleanup target level
MCL: Maximum Contaminant Level
MCLG: Maximum Contaminant Level Goal
NOAA: National Oceanic and Atmospheric Administration
NPDES: National Pollutant Discharge Elimination System
USEPA: United States Environmental Protection Agency
RSL: Regional Screening Level
TBC: To Be Considered guidance

Table 9B
Potential Location-Specific ARARs
PROTECO Superfund Site
Peñuelas, Puerto Rico

Description	Citation	ARAR/TBC	Summary	Status
Floodplain Management and Protection of Wetlands	44 CFR Part 9	ARAR	Regulations to restore and preserve natural and beneficial floodplain values and to minimize destruction, loss, or degradation of wetlands and preserve and enhance natural and beneficial wetlands values.	Poentially applicable to actions affecting or affected by floodplains and/or wetlands as defined in 44 CFR Part 9.4.
U.S. Army Corps of Engineers Nationwide Permit Program	33 CFR Part 330	ARAR	Regulations applicable if construction occurs in jurisdictional wetlands.	Potentially applicable to remedies that may impact jurisdictional wetlands.
Endangered Species Act of 1973	50 CFR Part 17	ARAR	Federal threatened and endangered species regulations	Potentially applicable if habitats for threatened or endangered species are present at the Site and the remedial action may jeopardize listed wildlife species, or destroy or adversely modify critical habitat.
U.S. Army Corps of Engineers Mitigation Rule	40 CFR 230 Subpart J and 33 CFR 332	ARAR	Compensatory mitigation is required to replace the loss of wetland and aquatic resource functions in the watershed, refers to the restoration, establishment, enhancement, or in certain circumstances preservation of wetlands, streams or other aquatic resources for the purpose of offsetting unavoidable adverse impacts.	Potentially applicable if a wetland is lost as a result of remedial action.
National Historic Preservation Act of 1966	16 USC 470	ARAR	Intended to preserve historical and cultural resources in the United States of America.	Potentially applicable if cultural resources are identified at the Site.

Notes and Abbreviations:
1. ARARs/TBCs are currently preliminary and represent potential ARARs/TBCs.

ARAR: applicable or relevant and appropriate requirement
CFR: Code of Federal Regulations
TBC: To Be Considered guidance
TBD: to be determined
EQB: Environmental Quality Board
USDA: United States Department of Agriculture
USC: United States Code

Table 9C
Example Action-Specific ARARs
PROTECO Superfund Site
Peñuelas, Puerto Rico

Description	Citation	ARAR/TBC	Summary	Status
Landfills				
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities Subpart N – Landfills	40 CFR 264.310 Closure and Post-Closure Care	ARAR	Requirements for final closure of a landfill.	Potentially applicable to on-site capping/containment alternatives.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities Subpart F - Releases From Solid Waste Management Units	40 CFR 264.91-101 Releases from Solid Waste Management Units	ARAR	Requirements for detecting, characterizing and responding to releases to groundwater for surface impoundments, waste piles, and land treatment units or landfills that receive hazardous waste.	Potentially applicable for the protection of groundwater.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities Subpart G - Closure and Post-Closure Care	40 CFR 264.111 and 117 Closure Performance Standard Post-Closure Care and Use of Property	ARAR	Establishes standards for the closure of, and post-closure care for sites containing hazardous wastes to minimize the need for further maintenance for the protection of human health and the environment. Post-closure use of the property must not disturb the integrity of the cover or containment system.	Potentially applicable to remedies involving on-site capping/containment.
Land Disposal Restrictions Subpart D – Treatment Standards	40 CFR 268.40 through 40 CFR 268.49	ARAR	Regulation that requires all hazardous waste to meet applicable treatment standards prior to land disposal. Land disposal includes placement in a landfill, surface impoundment, waste pile, land treatment facility or concrete vault/bunker designed for disposal purposes.	Potentially applicable to capping/consolidation alternatives or handling of treatment process residuals.
Puerto Rico Erosion and Sediment Control Handbook for Dweveloping Areas (Puerto Rico EQB and USDA - Natural Resources Conservation Services) (March 2005)	https://www.epa.gov/npdes/puerto-rico-erosion-and-sediment-control-handbook-developing-areas	TBC	Erosion and sediment control best management practices	Applicable to remedies affecting upland stormwater system
Discharge of Treatment System Effluent				
Federally Promulgated Water Quality Standards - Antidegradation Implementation Methods for the Commonwealth of Puerto Rico	40 CFR Part 131.42	ARAR	Federal regulation establishing implementation methods regarding antidegradation review of all point sources of pollution in accordance with Section 401 "Water Quality Certification Process" of the Clean Water Act	Potentially applicable to any portion of a remedy that may generate wastewater requiring discharge.

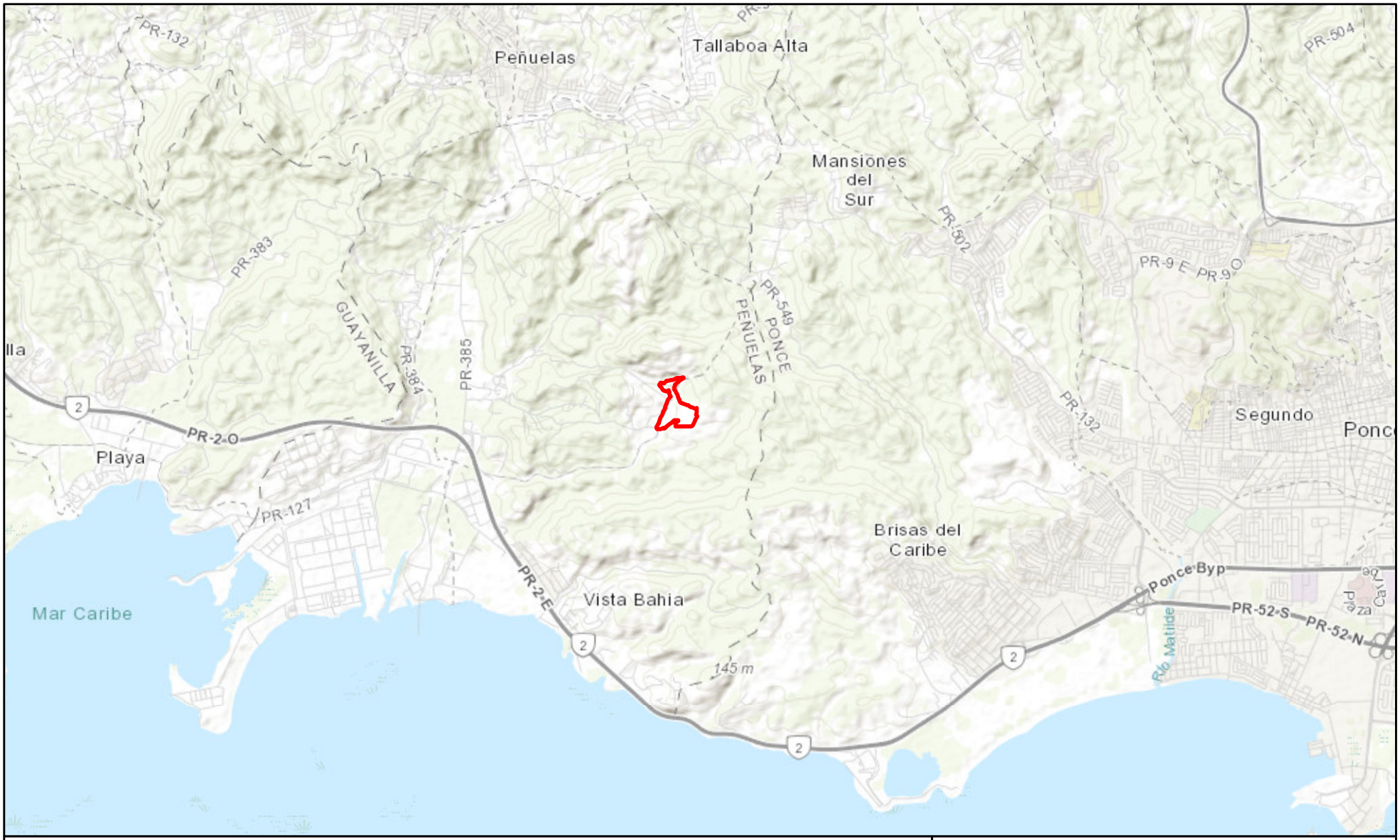
Table 9C
Example Action-Specific ARARs
PROTECO Superfund Site
Peñuelas, Puerto Rico

Description	Citation	ARAR/TBC	Summary	Status
Puerto Rico Water Quality Standards Regulation	Department of Natural and Environmental Resources, Water Quality Standards Regulation No. 9079 (April 2019), Rule 1300	ARAR	Establishes numerical groundwater and surface water criteria and standards for discharge limitations for anti-degradation of waters of Puerto Rico.	Potentially applicable to any portion of a remedy that may generate wastewater requiring discharge.
Puerto Rico Water Quality Standards Regulation - Attachment A (Department of Natural and Environmental Resources Anti-Degradation Policy Implementation Procedure)	Department of Natural and Environmental Resources, Water Quality Standards Regulation No. 9079 (April 2019), Rule 1300	ARAR	Establishes implementation methods regarding antidegradation review of all point sources of pollution in accordance with Section 401 "Water Quality Certification Process" of the Clean Water Act	Potentially applicable to any portion of a remedy that may generate wastewater requiring discharge.
EPA Administered Permit Programs: NPDES Subpart C - Permit Conditions	40 CFR 122.44 Establishing Limitations, Standards, and Other Permit Conditions	ARAR	Puerto Rico regulation establishing limitations, standards, and other permit conditions applicable to State NPDES programs.	Potentially applicable to any portion of a remedy that may generate wastewater requiring discharge.
Guidelines Establishing Test Procedures for the Analysis of Pollutants	40 CFR 136.1-4	ARAR	Regulation that specifies the procedures to be used to perform the measurements required for waste constituents under the NPDES program.	Potentially applicable to any portion of a remedy that may generate wastewater requiring discharge.
General Pretreatment Regulations for Existing and New Sources of Pollution	40 CFR Part 403	ARAR	Federal regulations for discharge to a POTW for treated effluent.	Potentially applicable if remedy results in discharge to a POTW.

Notes and Abbreviations:
1. ARARs/TBCs are currently preliminary and represent example ARARs/TBCs for general response actions that may or may not be appropriate for the Site.

ARAR: applicable or relevant and appropriate requirement
TBC: To Be Considered guidance
POTW: publicly-owned treatment works
NPDES: National Pollutant Discharge Elimination System
CFR: Code of Federal Regulations
TBC: To Be Considered guidance

FIGURES



PROTECO - Controlled Area (Approx.)

N

0 6,000 Feet

Site Location

Proteco Superfund Site
Peñuelas, Puerto Rico

Notes:
Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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Figure 1

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Building
Above Ground Storage Tanks
Former Waste Solidification Unit
Leachate Pond
Abandoned Leachate Sump
Cattle Pen Area
Road/ Trail

PROTECO - Controlled Fenced Area (Approx.)

Notes:
1. Feature locations are approximate
2. Sources:
Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)
1994-09-30 Overall Site Plan Existing Topography, C-2 Sheet #3 of 27 (OHM Remediation Services Corp.)
2008 Leachate Piping Fig 2.2 comments of operator PDF
2017-07-20 Project Note Site Reference Point (Weston Solutions Inc.)
2020 Digitized from Aerial Imagery (Esri)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 200 Feet

Current Site Features

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

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Figure 2

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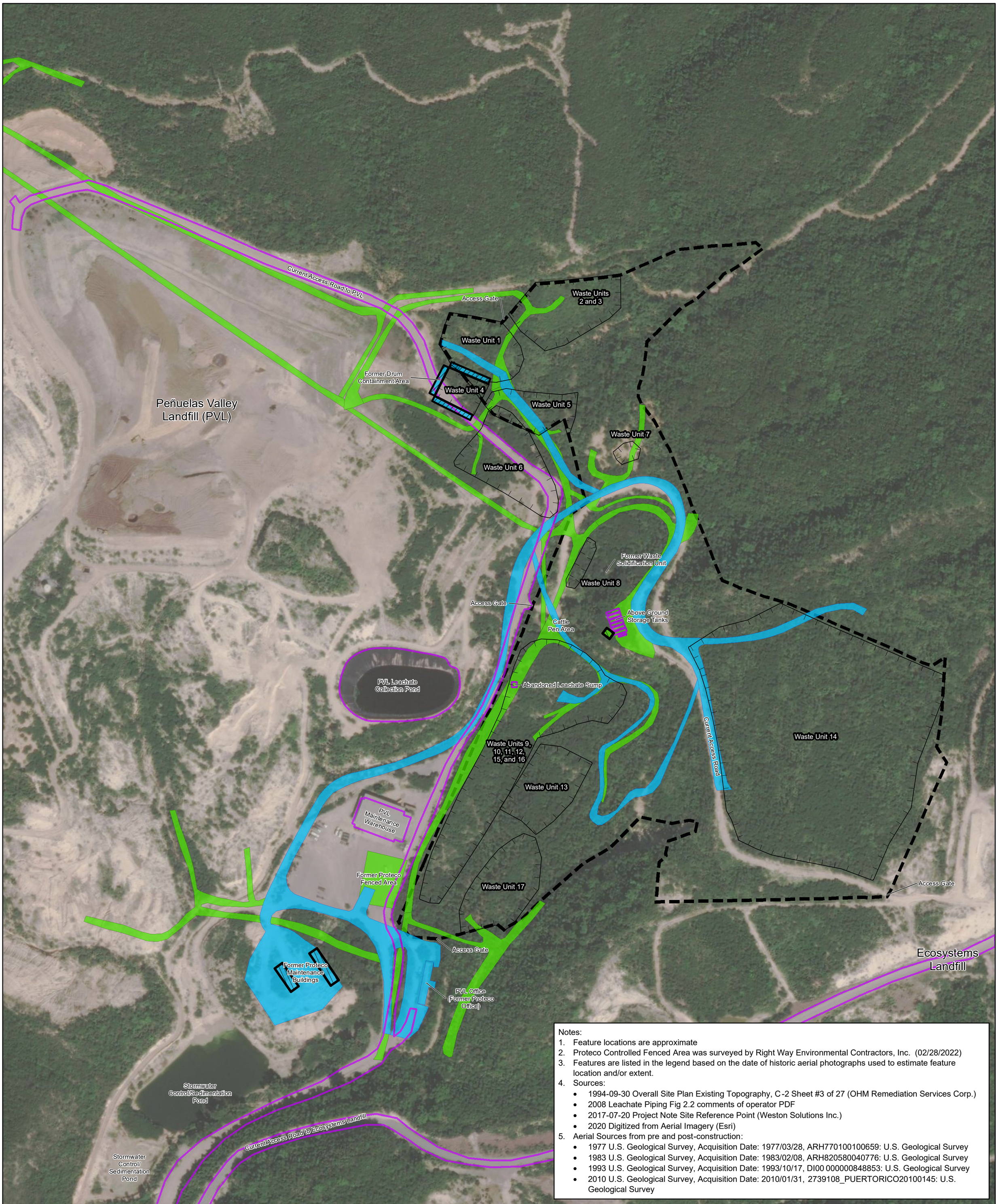

Notes:

1. Feature locations are approximate
2. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)
3. Features are listed in the legend based on the date of historic aerial photographs used to estimate feature location and/or extent.
4. Sources:
   - 1994-09-30 Overall Site Plan Existing Topography, C-2 Sheet #3 of 27 (OHM Remediation Services Corp.)
   - 2008 Leachate Piping Fig 2.2 comments of operator PDF
   - 2017-07-20 Project Note Site Reference Point (Weston Solutions Inc.)
   - 2020 Digitized from Aerial Imagery (Esri)
5. Aerial Sources from pre and post-construction:
   - 1977 U.S. Geological Survey, Acquisition Date: 1977/03/28, ARH770100100659: U.S. Geological Survey
   - 1983 U.S. Geological Survey, Acquisition Date: 1983/02/08, ARH820580040776: U.S. Geological Survey
   - 1993 U.S. Geological Survey, Acquisition Date: 1993/10/17, DI00 000000848853: U.S. Geological Survey
   - 2010 U.S. Geological Survey, Acquisition Date: 2010/01/31, 2739108_PUERTORICO20100145: U.S. Geological Survey

1983-1988 Former Site Features and Access Roads
1993-1994 Former Site Features and Access Roads
2008-Current Site Features
Former Building
Former Containment Area
Waste Units
PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 200 Feet

Current and Historic Site Features

Proteco Superfund Site
Peñuelas, Puerto Rico

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Figure 3

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Waste Unit 1	
Years	1975 to 1979[1]
Description	Drum burial landfill

Waste Unit 2	
Years	1975 to 1979[1]
Description	Drum burial landfill

Waste Unit 3	
Years	1975 to 1979[1]
Description	Drum burial landfill

Waste Unit 4	
Years	1975 to 1994[6]
Description	Above ground drum and container storage

Waste Unit 5	
Years	1975 to 1980[1]
Description	Drum burial landfill

Waste Unit 6	
Years	1975 to 1999[6]
Description	Sanitary landfill

Waste Unit 7	
Years	1975 to 1980[6]
Description	Neutralization impoundment

Waste Unit 8	
Years	1975 to 1980[6]
Description	Drum burial landfill

Waste Unit 9	
Years	1975 to 1985[6]
Description	Oil lagoon

Waste Unit 10	
Years	1975 to 1981[1]
Description	Immobilization facility

Waste Unit 11	
Years	1975 to 1982[1]
Description	Immobilization facility

Waste Unit 12	
Years	1975 to 1982[1]
Description	Land treatment area

Waste Unit 13	
Years	1975 to 1999[6]
Description	Rainwater basin

Waste Unit 14	
Years	1975 to 1999[6]
Description	Land treatment area

Waste Unit 15	
Years	1975 to 1983[1]
Description	Tank storage area

Waste Unit 16	
Years	1975 to 1999[6]
Description	Immobilization facility

Waste Unit 17	
Years	1975 to 1985[6]
Description	Neutralization impoundment

Notes:

PROTECO – Controlled Fenced Area source:
1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Waste Unit sources:
1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988 -02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

1. Years indicates reported estimated years of operation
2. Description indicates general operational summary of waste unit.[1]

[1] United States Environmental Protection Agency, Region II. 1986. RCRA Facility Assessment Preliminary Review Solid Waste Management Units at Proteccion Tecnica Ecologica (PROTECO), Inc. Caribbean Facilities Section. Hazardous Waste Facilities.

[6] Commonwealth of Puerto Rico. 2005. *Site Reassessment Letter, Proteccion Tecnica Ecologica, Inc (PROTECO)* . Puerto Rico Environmental Quality Board. PRD000831487.

Surveyed Waste Unit (Approx.)
Waste Unit (Approx.)[2, 3]
Waste Unit (Approx.)[2, 3]
PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 150 Feet

Operational Summary of Waste Units

Proteco Superfund Site
Peñuelas, Puerto Rico

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Figure 4

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PEÑUELAS
MUNICIPIO

PROTECO SITE

PEÑUELAS
MUNICIPIO

PEÑUELAS

PROTECO - Controlled Fenced Area (Approx.)

Notes:
1. Contour units shown in feet. (Contour Interval = 20 feet)
2. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)
3.Topographic Source: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed August, 2021.

N

0 400 Feet

Topographic Map

Proteco Superfund Site
Peñuelas, Puerto Rico

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Figure 5

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Waste Units 2 and 3
Waste Unit 1
Waste Unit 4
Waste Unit 5
Waste Unit 6
Waste Unit 7
Waste Unit 8
Waste Units 9, 10, 11, 12, 15, and 16
Waste Unit 14
Waste Unit 13
Waste Unit 17

Notes:

Hydrology source:

1. 20 Digital Elevation Mod el (DEM) image tiles were processed using GIS for drainage flow calculations.
    a. U.S. Geological Survey (USGS), 20200429, USGS Original Product Resolution PR PRVI A 2018 19QGV……: U.S. Geological Survey

PROTECO – Controlled Fenced Area source:

1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Waste Unit sources:

1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

Calculated Drainage Order:

1. Drainage flow directions were calculated from 2018 DEM image tiles, creating a raster of flow direction from each cell to its downslope neighbor, or neighbors. A flow direction was assigned based on the D8 flow method. This method assigns flow direction to the steepest downslope neighbor.
2. Drainage accumulation was calculated from the flow direction data, resulting in a raster of accumulated flow into each cell.
3. The results of the drainage flow direction and drainage accumulation were used to calculate drainage orders, which assigned a numeric order to segments of a raster representing branches of a linear network. The Strahler method of drainage ordering, drainage feature order only increases when features of the same order intersect. Therefore, the intersection of a first-order and second-order link will remain a second-order link, rather than creating a third-order link.

Calculated Drainage Order (Category)

- 2
- 3
- 4
- 5
- 6
- Unnamed Creek Drainage Basin

- Drainage Basin
- Parcel Boundary (Approx.)
- Waste Unit (Approx.)
- PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 500 Feet

Local Surface Hydrology

Proteco Superfund Site
Peñuelas, Puerto Rico

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Figure 6

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Tallaboa Poniente

Peñuelas Valley Landfill

Ecosystems Landfill

Tallaboa Saliente

Tallaboa River

Encarnacion

Vista Bahia

Tallaboa Bay

Atlantic Ocean

Notes:

Hydrology source:

1. 20 Digital Elevation Model (DEM) image tiles were processed using GIS for drainage flow calculations.
   a. U.S. Geological Survey (USGS), 20200429, USGS Original Product Resolution PR PRVI A 2018 19QGV……: U.S. Geological Survey

PROTECO – Controlled Fenced Area source:

1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Waste Unit sources:

1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

Calculated Drainage Order:

1. Drainage flow directions were calculated from 2018 DEM image tiles, creating a raster of flow direction from each cell to its downslope neighbor, or neighbors. A flow direction was assigned based on the D8 flow method. This method assigns flow direction to the steepest downslope neighbor.
2. Drainage accumulation was calculated from the flow direction data, resulting in a raster of accumulated flow into each cell.
3. The results of the drainage flow direction and drainage accumulation were used to calculate drainage orders, which assigned a numeric order to segments of a raster representing branches of a linear network. The Strahler method of drainage ordering, drainage feature order only increases when features of the same order intersect. Therefore, the intersection of a first-order and second-order link will remain a second-order link, rather than creating a third-order link.

Calculated Drainage Order (Category)

- 2
- 3
- 4
- 5
- 6
- Unnamed Creek Drainage Basin

- Drainage Basin
- Waste Unit (Approx.)
- PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (10/12/2019)

N

0 1,200 Feet

Unnamed Creek Drainage Basin Surface Hydrology

Proteco Superfund Site
Peñuelas, Puerto Rico

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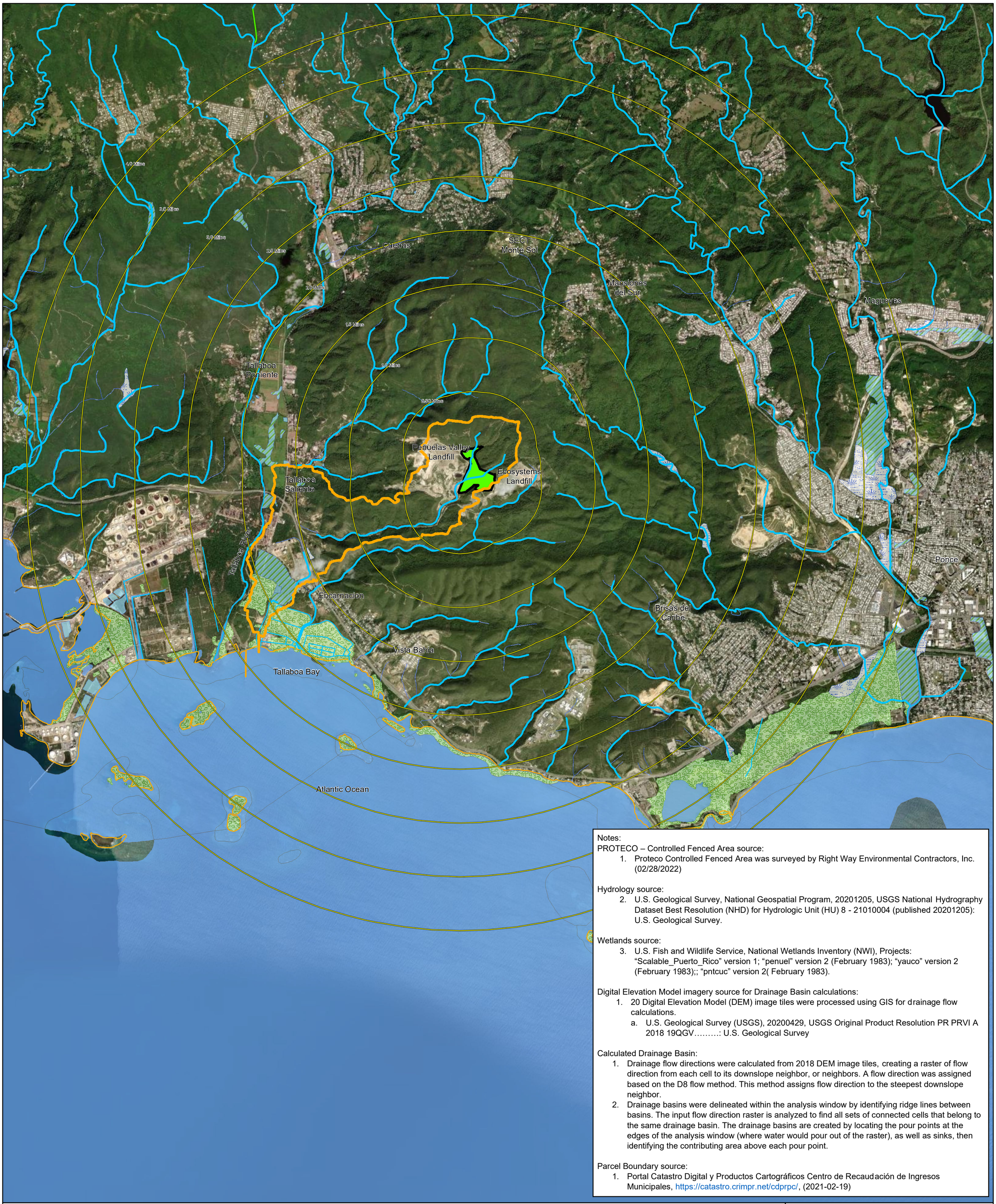
Figure 7

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\Fig7_ProtecoDrainBasinSurfaceHydrology.mxd 6/28/2022 12:17:08 PM



Notes:
PROTECO – Controlled Fenced Area source:

1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Hydrology source:

2. U.S. Geological Survey, National Geospatial Program, 20201205, USGS National Hydrography Dataset Best Resolution (NHD) for Hydrologic Unit (HU) 8 - 21010004 (published 20201205): U.S. Geological Survey.

Wetlands source:

3. U.S. Fish and Wildlife Service, National Wetlands Inventory (NWI), Projects: “Scalable_Puerto_Rico” version 1; “penuel” version 2 (February 1983); “yauco” version 2 (February 1983);; “pntcuc” version 2(February 1983).

Digital Elevation Model imagery source for Drainage Basin calculations:

1. 20 Digital Elevation Model (DEM) image tiles were processed using GIS for drainage flow calculations.
   a. U.S. Geological Survey (USGS), 20200429, USGS Original Product Resolution PR PRVI A 2018 19QGV…….: U.S. Geological Survey

Calculated Drainage Basin:

1. Drainage flow directions were calculated from 2018 DEM image tiles, creating a raster of flow direction from each cell to its downslope neighbor, or neighbors. A flow direction was assigned based on the D8 flow method. This method assigns flow direction to the steepest downslope neighbor.
2. Drainage basins were delineated within the analysis window by identifying ridge lines between basins. The input flow direction raster is analyzed to find all sets of connected cells that belong to the same drainage basin. The drainage basins are created by locating the pour points at the edges of the analysis window (where water would pour out of the raster), as well as sinks, then identifying the contributing area above each pour point.

Parcel Boundary source:

1. Portal Catastro Digital y Productos Cartográficos Centro de Recaudación de Ingresos Municipales, https://catastro.crimpr.net/cdprpc/, (2021-02-19)

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine
- Artificial Path
- Canal Ditch
- Coastline
- Pipeline
- Stream River
- Unnamed Creek Drainage Basin
- Search Radius (0.5 Mile Interval)
- PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 3,000 Feet

Regional Surface Hydrology and Wetlands

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 8

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\Fig8_SurfaceHydrologyRegional_3mile.mxd 6/28/2022 11:56:19 AM

3.0 Miles
2.5 Miles
2.0 Miles
1.5 Miles
1.0 Miles
0.50 Miles
Cuebas
SECT
Monte Sol
Mansiones
del Sur
Tallaboa
Poniente
Tallaboa
Saliente
R-I
R-I
R-I
CR
Peñuelas Valley Landfill
I-P
SITE
Ecosystems Landfill
R-G
P-R
I
D
VIAL
I-L
Tallaboa River
Encarnacion
Vista Bahia
Brisas del
Caribe
Tallaboa Bay

Notes:
Proteco Controlled Area source:
1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Parcel Boundaries and Land Use source:
2. Portal Catastro Digital y Productos Cartográficos Centro de Recaudación de Ingresos Municipales, https://catastro.crimpr.net/cdprpc/ , (2021-02-19)

Land use and Municipal Boundary sources:
3. https://sige.pr.gov/server/rest/services/cali_clasi/comentarios_cali_21/MapServer, accessed 3/26/2021. cali_clasi/calivigente, https://sige.pr.gov/server/services , (2021-02-19)

PROTECO - Controlled Fenced Area (Approx.)
Search Radius (0.5 Mile Interval)
A-G: General Agricultural
A-P: Agricultural Productive
AGUA: Water
ARD: Developed Rural Area
C-I: Intermediate Commercial
C-L: Light Commercial
C-T: Tourist Commercial
CR: Resource Conservation
D: Publicly Endowed Lands
I: Industrial
I-E
I-L: Light Industrial
I-P: Heavy Industrial
P-R: Preservation of Resources
R-EA
R-G: Rural General
R-I: Intermediate Residential
R-T: Tourist Residential
R-U: Low Density Residential
VIAL: Road system

Aerial Imagery dated (11/28/2020) Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

N
0 1,520 Feet

Site Vicinity Land Use

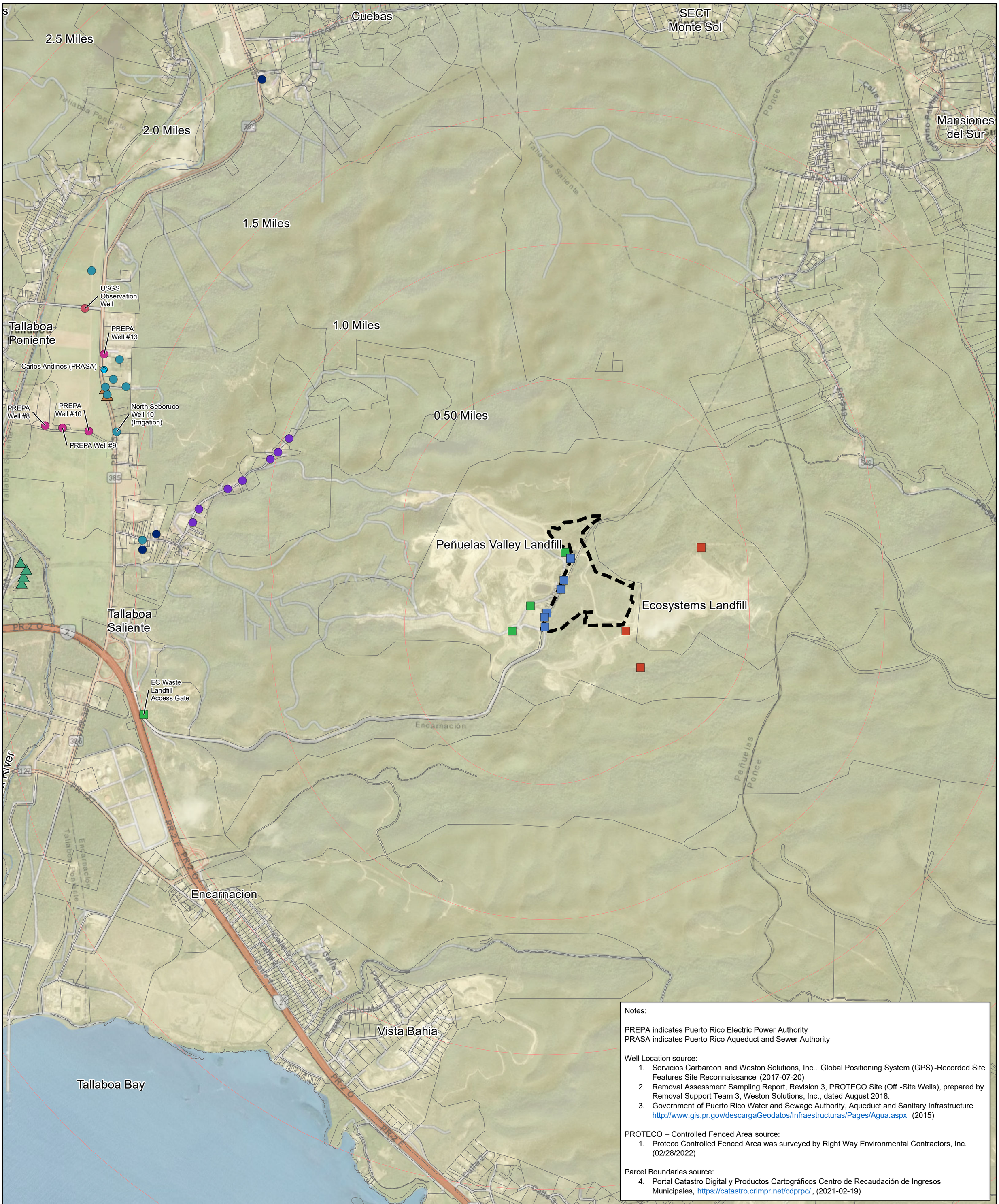
Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 9

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\Fig9_VicinityLandUse.mxd 6/28/2022 9:19:35 AM



Notes:

PREPA indicates Puerto Rico Electric Power Authority
PRASA indicates Puerto Rico Aqueduct and Sewer Authority

Well Location source:

1. Servicios Carbareon and Weston Solutions, Inc.. Global Positioning System (GPS) -Recorded Site Features Site Reconnaissance (2017-07-20)
2. Removal Assessment Sampling Report, Revision 3, PROTECO Site (Off -Site Wells), prepared by Removal Support Team 3, Weston Solutions, Inc., dated August 2018.
3. Government of Puerto Rico Water and Sewage Authority, Aqueduct and Sanitary Infrastructure http://www.gis.pr.gov/descargaGeodatos/Infraestructuras/Pages/Agua.aspx (2015)

PROTECO – Controlled Fenced Area source:

1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Parcel Boundaries source:

4. Portal Catastro Digital y Productos Cartográficos Centro de Recaudación de Ingresos Municipales, https://catastro.crimpr.net/cdprpc/ , (2021-02-19)

- PRASA Drinking Water Supply Well
- EC Waste Landfill Monitoring Well
- Ecosystems Landfill Monitoring Well
- Proteco Monitoring Well
- USGS Observation Well
- North Seboruco Well
- PREPA Industrial Process and Drinking Water Well
- Domestic Well
- Possible Domestic Well
- Suspected Industrial Well (Corco)
- Suspected Industrial Well (Dow Chemical)
- 0.5 Mile Interval Radius
- Parcel Boundary (Approx.)
- PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community (11/28/2020)

N

0 1,200 Feet

Vicinity Groundwater Wells

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 10

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\Fig10_VicinityWells.mxd 6/28/2022 9:14:10 AM

Tjc
Tjl
12
Tjc
A'
Tjd
Tjc
15
15
10
10
Tjc
Fault
20
Tjl
15
Qa
Fault
27
15
Qa
11
23
W
12
25
13
Fault
W
20
Qa
Tjc
A-A'
W
20
10
Fault
18
15
10
27
Fault
Qa
20
Qa
Qa
Qa
A
Qa
Qa
A
A'
METERS
700
600
500
400
300
200
100
SEA LEVEL
100
200
300
Tp
Tjc
Tp
Tjc
Tjl
Tjd
Tjd
Tjl
Tjd

Notes:
Geology sources:
1. USGS digital map Geology of the Island of Puerto Rico, at a Scale of 1:100,000 Geología (pr.gov) (1999)
2. USGS Geologic Map of Penuelas and Punta Cuchara Quadrangles, Puerto Rico (1978)

PROTECO – Controlled Fenced Area source:
1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

PROTECO - Controlled Fenced Area (Approx.)
Fault
Inferred Fault
Strike Dip Symbol (Labeled: Dip Angle)
Geologic Map Transect

Qa, Alluvium
Tjc, Juana Díaz Formation; Chalk Member
Tjl, Juana Díaz Formation; Limestone member
Tjd, Juana Díaz Limestone; Mudstone and basal conglomerate Member
Tp, Ponce Limestone
W, Water

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community (11/28/2020)

N

0 800 Feet

Geologic Map

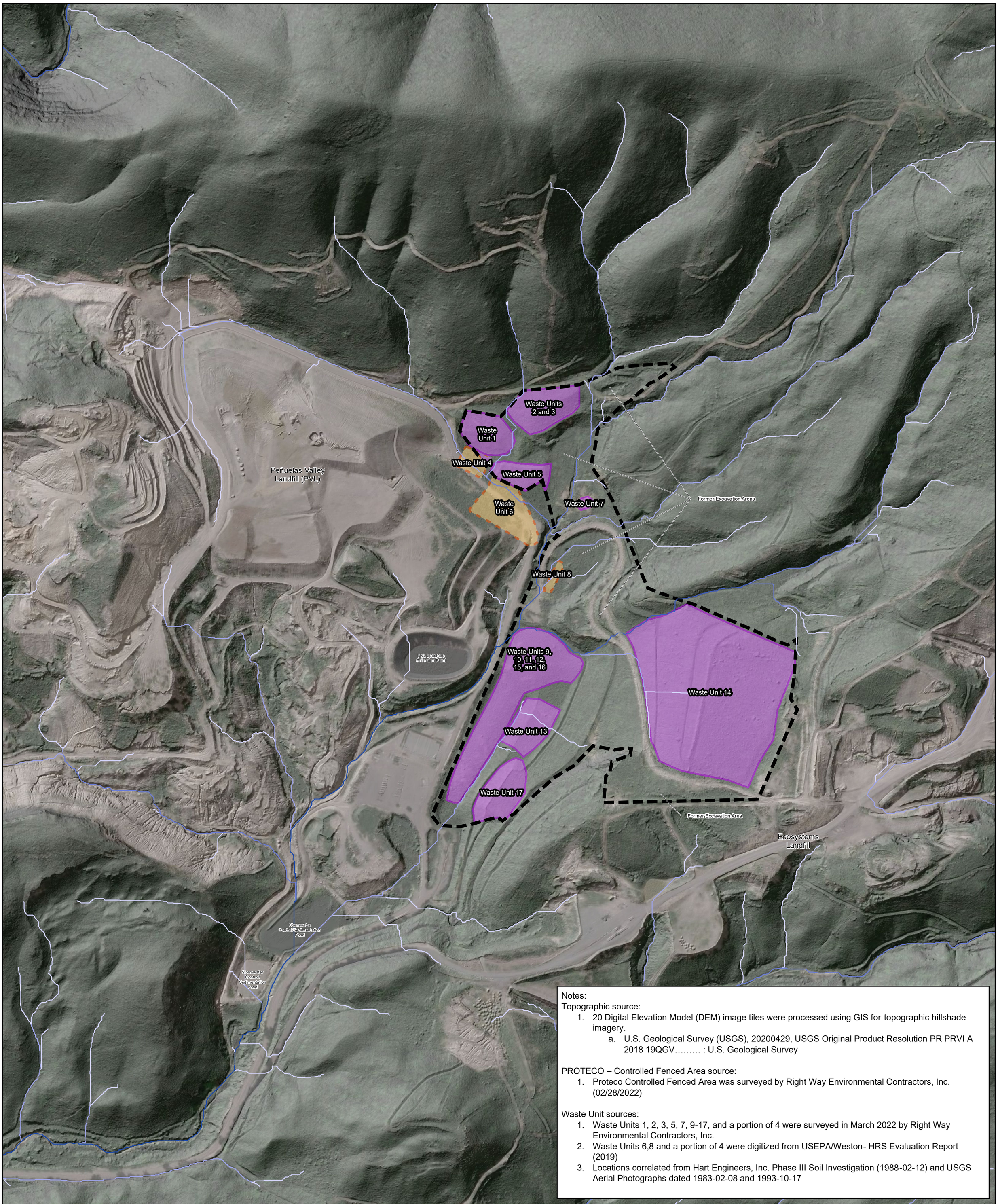
Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 11

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\Fig11_GeologicMap2.mxd 6/28/2022 9:18:46 AM



Notes:

Topographic source:

1. 20 Digital Elevation Model (DEM) image tiles were processed using GIS for topographic hillshade imagery.
    a. U.S. Geological Survey (USGS), 20200429, USGS Original Product Resolution PR PRVI A 2018 19QGV…… : U.S. Geological Survey

PROTECO – Controlled Fenced Area source:

1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Waste Unit sources:

1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

Surveyed Waste Unit (Approx.)

Waste Unit (Approx.)[2, 3]

Waste Unit (Approx.)[2, 3]

PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 300 Feet

Surface Relief Map

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 12

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\Fig12_SurfaceReliefMap.mxd 6/28/2022 9:28:32 AM

Current Access Road to PVL
Access Gate
Waste Units 2 and 3
43WS-86 [309.46]
16W-85 [NM]
Waste Unit 1
44WS-86 [330.49]
Former Drum Containment Area
Waste Unit 4
4W-81 [NM]
Waste Unit 4
325
Peñuelas Valley Landfill (PVL)
Waste Unit 5
54MWS-88 [NM]
42WS-86 [310.11]
315
15W-85 [314.35]
Waste Unit 7
Waste Unit 6
9W-81 [NM]
51WS-86 [312.31]
14W-85 [309.37]
56MWS-88 [NM]
305
Former Waste Solidification Unit
Waste Unit 8
55WS-88 [NM]
Access Gate
Above Ground Storage Tanks
22W-85 [293.38]
Cattle Pen Area
295
PVL Leachate Collection Pond
285
Waste Units 9, 10, 11, 12, 15, and 16
Current Access Road
Waste Unit 14
275
58MWS-88 [NM]
29W-85 [294.83]
265
36WS-86 [263.73]
26W-85 [278.90]
Waste Unit 13
32W-85 [288.96]
48WS-86 [249.56]
PVL Maintenance Warehouse
30W-85 [260.55]
28W-85 [275.30]
255
23W-85 [260.49]
Former Proteco Fenced Area
Waste Unit 17
18W-85 [250.55]
59MWS-88 [NM]
21W-85 [250.73]
Access Gate
Former Proteco Maintenance Buildings
PVL Office (Former Proteco Office)
Stormwater Control/Sedimentation Pond
Ecosystems Landfill

Notes:

- Source of surveyed top-of-casing and groundwater elevation data: Fred C. Hart Associates, Inc. 1987. Phase IA Hydrogeologic Investigation, Proteccion Tecnica Ecologica, Inc. (Proteco). Volume 1. Pittsburgh, PA.
- Units for surveyed top-of-casing and groundwater elevation data in 1987 report were reported as feet above mean sea level. No vertical datum was reported.
- NM indicates not measured.
- Locations ending in "...-88" were not installed during this water level measurement event

Sample Location Sources:

1. 1987-02 Phase 1A Hydrogeologic Investigation (Fred C. Hart Associates, Inc.)
2. 1988-02-12 Phase III Soil Investigation (Hart Engineers, Inc.)
3. 1992-05 Site Map, Appendix B, (page 1543 of 1587)(OHM Remediation Services Corp.)
4. 1992-05-13 Hydrogeologic Data Interpretation (OHM Remediation Services Corp.)
5. 1994-07-05 Fig 2.1 Site Plan (page 9 of 179)(OHM Remediation Services Corp.)
6. 1994-09-30 Overall Site Plan Existing Topography, (OHM Remediation Service Corp.)
7. 2017-07-20 Project Note Site Reference Points (Weston Solutions Inc.)

Waste Unit sources:

1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

PROTECO – Controlled Fenced Area source:

4. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

- Former Principal Water Bearing Unit Monitoring Well
- Former Principal Water Bearing Unit Monitoring Well (Not used for contouring)
- Potentiometric Surface Contour (ft/msl)
- Flow Direction
- PROTECO - Controlled Fenced Area (Approx.)
- Surveyed Waste Unit (Approx.)
- Waste Unit (Approx.)[2, 3]
- Waste Unit (Approx.)[2, 3]
- Building
- Above Ground Storage Tanks
- Former Waste Solidification Unit
- Road/ Trail (2020)
- Leachate Pond (2020)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 150 Feet

Principal Water Bearing Unit Groundwater Elevations February 1987

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 13

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\Fig13_GW_Principal_WBZ_19870206.mxd 6/28/2022 9:27:20 AM

52WD-86
[186.06]

Current Access Road to PVL

188

190

192

194

196

198

200

202

Peñuelas Valley
Landfill (PVL)

Former Drum
Containment Area

Waste Unit 1

Waste Units
2 and 3

Waste Unit 4

Waste
Unit 4

Waste Unit 5

Waste Unit 6

Waste Unit 7

51WD-86
[190.43]

Waste Unit 8

Former Waste
Solidification Unit

50WD-86
[202.7]

Cattle
Pen Area

Above Ground
Storage Tanks

PVL Leachate
Collection Pond

Waste Units 9,
10, 11, 12,
15, and 16

Waste Unit 14

Current Access Road

Waste Unit 13

48WD-86
[202.79]

PVL
Maintenance
Warehouse

Waste Uni

PVL Office
(Former Proteco
Office)

Stormwater
Control/Sedimentation
Pond

Notes:

- Source of surveyed top-of-casing and groundwater elevation data: Fred C. Hart Associates, Inc. 1987. Phase IA Hydrogeologic Investigation, Proteccion Tecnica Ecologica, Inc. (Proteco). Volume 1. Pittsburgh, PA.
- Units for surveyed top-of-casing and groundwater elevation data in 1987 report were reported as feet above mean sea level. No vertical datum was reported.
- NM indicates not measured.
- Locations ending in "...-88" were not installed during this water level measurement event

Sample Location Sources:

1. 1987-02 Phase 1A Hydrogeologic Investigation (Fred C. Hart Associates, Inc.)
2. 1988-02-12 Phase III Soil Investigation (Hart Engineers, Inc.)
3. 1992-05 Site Map, Appendix B, (page 1543 of 1587)(OHM Remediation Services Corp.)
4. 1992-05-13 Hydrogeologic Data Interpretation (OHM Remediation Services Corp.)
5. 1994-07-05 Fig 2.1 Site Plan (page 9 of 179)(OHM Remediation Services Corp.)
6. 1994-09-30 Overall Site Plan Existing Topography, (OHM Remediation Service Corp.)
7. 2017-07-20 Project Note Site Reference Points (Weston Solutions Inc.)

Waste Unit sources:

1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

PROTECO – Controlled Fenced Area source:

4. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

- Former Reef Limestone Water Bearing Unit Monitoring Well
- Reef Limestone / Lenticular Deposit Contour (ft/msl)
- Flow Direction
- PROTECO - Controlled Fenced Area (Approx.)
- Surveyed Waste Unit (Approx.)
- Waste Unit (Approx.)[2, 3]
- Waste Unit (Approx.)[2, 3]
- Building
- Above Ground Storage Tanks
- Former Waste Solidification Unit
- Road/ Trail (2020)
- Leachate Pond (2020)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 150 Feet

**Reef Limestone Groundwater Elevations
February 1987**

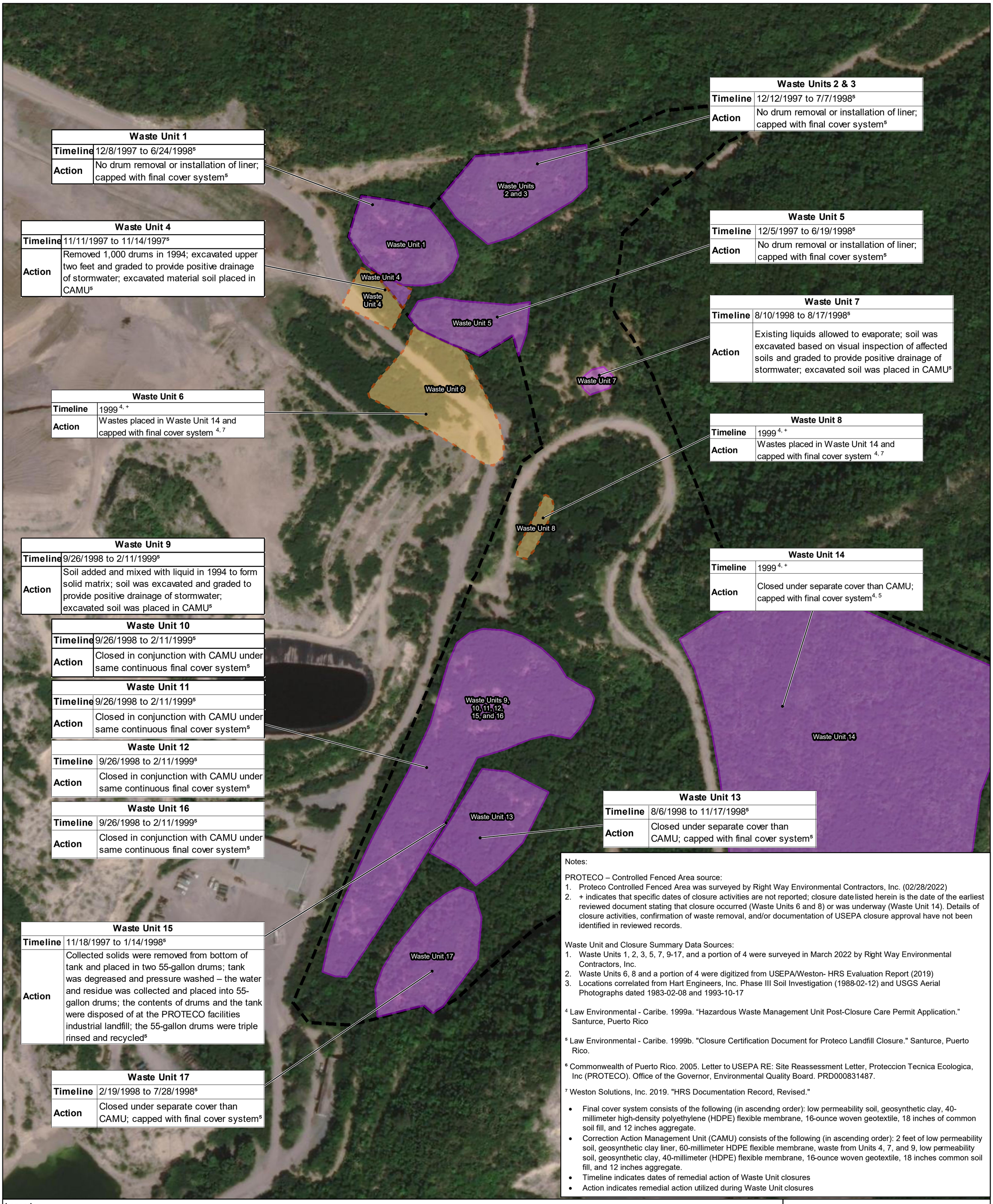
Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 14

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\Fig14_GW_ReefLS_WBZ_19870206v2.mxd 6/28/2022 9:32:03 AM



Waste Unit 1	
Timeline	12/8/1997 to 6/24/1998[5]
Action	No drum removal or installation of liner; capped with final cover system[5]

Waste Unit 4	
Timeline	11/11/1997 to 11/14/1997[5]
Action	Removed 1,000 drums in 1994; excavated upper two feet and graded to provide positive drainage of stormwater; excavated material soil placed in CAMU[5]

Waste Unit 6	
Timeline	1999 [4, +]
Action	Wastes placed in Waste Unit 14 and capped with final cover system [4, 7]

Waste Unit 9	
Timeline	9/26/1998 to 2/11/1999[5]
Action	Soil added and mixed with liquid in 1994 to form solid matrix; soil was excavated and graded to provide positive drainage of stormwater; excavated soil was placed in CAMU[5]

Waste Unit 10	
Timeline	9/26/1998 to 2/11/1999[5]
Action	Closed in conjunction with CAMU under same continuous final cover system[5]

Waste Unit 11	
Timeline	9/26/1998 to 2/11/1999[5]
Action	Closed in conjunction with CAMU under same continuous final cover system[5]

Waste Unit 12	
Timeline	9/26/1998 to 2/11/1999[5]
Action	Closed in conjunction with CAMU under same continuous final cover system[5]

Waste Unit 16	
Timeline	9/26/1998 to 2/11/1999[5]
Action	Closed in conjunction with CAMU under same continuous final cover system[5]

Waste Unit 15	
Timeline	11/18/1997 to 1/14/1998[5]
Action	Collected solids were removed from bottom of tank and placed in two 55-gallon drums; tank was degreased and pressure washed – the water and residue was collected and placed into 55-gallon drums; the contents of drums and the tank were disposed of at the PROTECO facilities industrial landfill; the 55-gallon drums were triple rinsed and recycled[5]

Waste Unit 17	
Timeline	2/19/1998 to 7/28/1998[5]
Action	Closed under separate cover than CAMU; capped with final cover system[5]

Waste Units 2 & 3	
Timeline	12/12/1997 to 7/7/1998[5]
Action	No drum removal or installation of liner; capped with final cover system[5]

Waste Unit 5	
Timeline	12/5/1997 to 6/19/1998[5]
Action	No drum removal or installation of liner; capped with final cover system[5]

Waste Unit 7	
Timeline	8/10/1998 to 8/17/1998[5]
Action	Existing liquids allowed to evaporate; soil was excavated based on visual inspection of affected soils and graded to provide positive drainage of stormwater; excavated soil was placed in CAMU[5]

Waste Unit 8	
Timeline	1999 [4, +]
Action	Wastes placed in Waste Unit 14 and capped with final cover system [4, 7]

Waste Unit 14	
Timeline	1999 [4, +]
Action	Closed under separate cover than CAMU; capped with final cover system[4, 5]

Waste Unit 13	
Timeline	8/6/1998 to 11/17/1998[5]
Action	Closed under separate cover than CAMU; capped with final cover system[5]

Notes:

PROTECO – Controlled Fenced Area source:
1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)
2. + indicates that specific dates of closure activities are not reported; closure date listed herein is the date of the earliest reviewed document stating that closure occurred (Waste Units 6 and 8) or was underway (Waste Unit 14). Details of closure activities, confirmation of waste removal, and/or documentation of USEPA closure approval have not been identified in reviewed records.

Waste Unit and Closure Summary Data Sources:
1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6, 8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

[4] Law Environmental - Caribe. 1999a. “Hazardous Waste Management Unit Post-Closure Care Permit Application.” Santurce, Puerto Rico

[5] Law Environmental - Caribe. 1999b. "Closure Certification Document for Proteco Landfill Closure." Santurce, Puerto Rico.

[6] Commonwealth of Puerto Rico. 2005. Letter to USEPA RE: Site Reassessment Letter, Proteccion Tecnica Ecologica, Inc (PROTECO). Office of the Governor, Environmental Quality Board. PRD000831487.

[7] Weston Solutions, Inc. 2019. "HRS Documentation Record, Revised."

- Final cover system consists of the following (in ascending order): low permeability soil, geosynthetic clay, 40-millimeter high-density polyethylene (HDPE) flexible membrane, 16-ounce woven geotextile, 18 inches of common soil fill, and 12 inches aggregate.
- Correction Action Management Unit (CAMU) consists of the following (in ascending order): 2 feet of low permeability soil, geosynthetic clay liner, 60-millimeter HDPE flexible membrane, waste from Units 4, 7, and 9, low permeability soil, geosynthetic clay, 40-millimeter (HDPE) flexible membrane, 16-ounce woven geotextile, 18 inches common soil fill, and 12 inches aggregate.
- Timeline indicates dates of remedial action of Waste Unit closures
- Action indicates remedial action utilized during Waste Unit closures

Legend
- Surveyed Waste Unit (Approx.)
- Waste Unit (Approx.)[2, 3]
- Waste Unit (Approx.)[2, 3]
- PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 150 Feet

Summary of Reported Waste Unit Closure Activities

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 15

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\Fig15_ClosureSummaryofWasteUnits2.mxd 6/28/2022 9:31:41 AM

Waste Unit 1

- 06/13/17: observed to be overgrown with vegetation[8]
- 12/13/17: after Hurricanes Irma and Maria, herbaceous vegetation observed to be intact and large trees remained standing with only bent or broken limbs; small trees were uprooted in some areas, resulting in voids in the soil[8]

Waste Unit 2

- 08/23/99: rills and gullies observed ranging from 12 to 18 inches in depth[9]
- 11/13/01: erosion problems observed[10]
- 06/13/17: observed to be overgrown with vegetation[8]
- 12/13/17: after Hurricanes Irma and Maria, herbaceous vegetation observed to be intact and large trees remained standing with only bent or broken limbs; small trees were uprooted in some areas, resulting in voids in the soil[8]

Waste Unit 3

- 08/23/99: rills and gullies observed ranging from 12 to 18 inches in depth[9]
- 11/13/01: erosion problems observed[10]
- 12/13/17: after Hurricanes Irma and Maria, herbaceous vegetation observed to be intact and large trees remained standing with only bent or broken limbs; small trees were uprooted in some areas, resulting in voids in the soil[8]

Waste Unit 4

Not reported

Waste Unit 5

- 08/23/99: woody plants (less than 2 ft in height) observed growing on cover[9]
- 11/13/01: no woody plants observed[10]
- 12/13/17: after Hurricanes Irma and Maria, herbaceous vegetation observed to be intact and large trees remained standing with only bent or broken limbs; small trees were uprooted in some areas, resulting in voids in the soil[8]

Waste Unit 6

Not reported

Waste Unit 7

Not reported

Waste Unit 8

Not reported

Waste Unit 9

- 08/23/99: woody plants (less than 2 ft in height) observed growing on cover; rills and gullies observed on northwest corner and east side of south transition slope[9]
- 11/13/01: no woody plants observed[10]

Waste Unit 10

Not reported

Waste Unit 11

Not reported

Waste Unit 12

- 08/23/99: perimeter ditch to east observed to be eroded and in need of repair near southernmost end; woody plants (less than 2 ft in height) observed growing on cover; rills and gullies observed on northwest corner and east side of south transition slope[9]
- 11/13/01: perimeter ditch to east observed to be repaired; no woody plants observed[10]

Waste Unit 14

Not reported

Waste Unit 16

- 08/23/99: perimeter ditch to east observed to be eroded and in need of repair near southernmost end; woody plants (less than 2 ft in height) observed growing on cover; rills and gullies observed on northwest corner and east side of south transition slope[9]
- 11/13/01: perimeter ditch to east observed to be repaired; no woody plants observed[10]

Waste Unit 13

- 08/23/99: rills and gullies observed on sloped area adjacent to unit; ponding observed in perimeter ditch east of unit; woody plants (less than 2 ft in height) observed growing on cover[9]
- 11/13/01: no ponding observed in perimeter ditch; no woody plants observed[10]

Waste Unit 15

Not reported

Waste Unit 17

- 08/23/99: woody plants (less than 2 ft in height) observed growing on cover; rills and gullies observed on northwest corner and east side of south transition slope[9]
- 11/13/01: no woody plants observed[10]

Waste Units 2 and 3
Waste Unit 1
Waste Unit 4
Waste Unit 5
Waste Unit 6
Waste Unit 7
Waste Unit 8
Waste Units 9, 10, 11, 12, 15, and 16
Waste Unit 14
Waste Unit 13
Waste Unit 17

Notes:

PROTECO – Controlled Fenced Area source:

1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Waste Unit and Post-Closure Summary Data Sources:

1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

[8] Weston Solutions, Inc. 2017. "Project Note: December 2017 Site Reconnaissance."

[9] Law Environmental - Caribe. 2000. "Annual Inspection Report Fall 2000 for Closed RCRA Hazardous Waste Units." Santurce, Puerto Rico.

[10] Law Environmental - Caribe. 2001. "2001 Annual Inspection Report RCRA Units Former PROTECO Facility." Rio Piedras, Puerto Rico.

Surveyed Waste Unit (Approx.)
Waste Unit (Approx.)[2,]
Waste Unit (Approx.)[2,]
PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 150 Feet

Summary of Reported Waste Unit Post-Closure Activities

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

Figure 16

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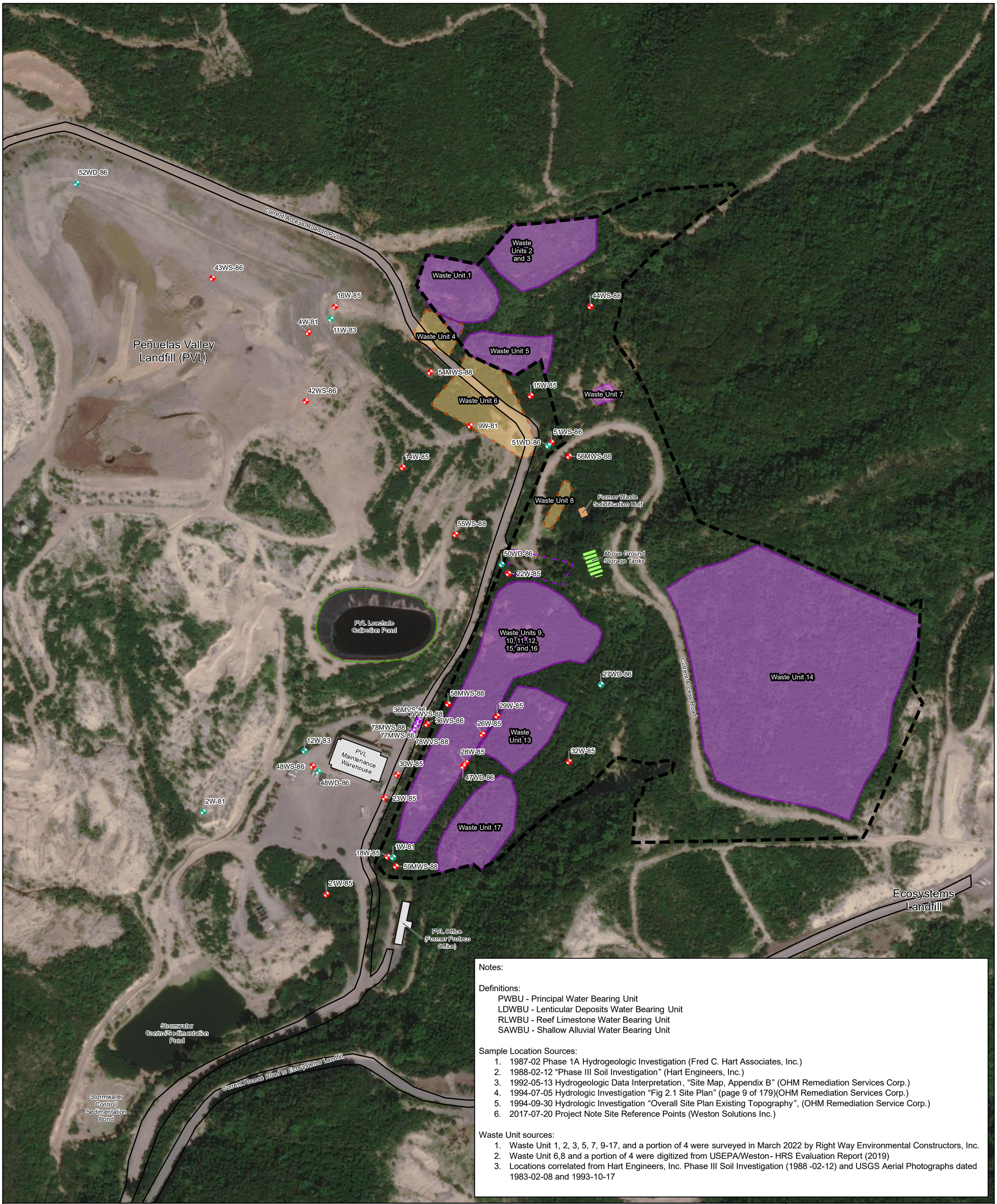

Notes:

Definitions:
- PWBU - Principal Water Bearing Unit
- LDWBU - Lenticular Deposits Water Bearing Unit
- RLWBU - Reef Limestone Water Bearing Unit
- SAWBU - Shallow Alluvial Water Bearing Unit

Sample Location Sources:
1. 1987-02 Phase 1A Hydrogeologic Investigation (Fred C. Hart Associates, Inc.)
2. 1988-02-12 “Phase III Soil Investigation” (Hart Engineers, Inc.)
3. 1992-05-13 Hydrogeologic Data Interpretation, “Site Map, Appendix B” (OHM Remediation Services Corp.)
4. 1994-07-05 Hydrologic Investigation “Fig 2.1 Site Plan” (page 9 of 179)(OHM Remediation Services Corp.)
5. 1994-09-30 Hydrologic Investigation “Overall Site Plan Existing Topography”, (OHM Remediation Service Corp.)
6. 2017-07-20 Project Note Site Reference Points (Weston Solutions Inc.)

Waste Unit sources:
1. Waste Unit 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Constructors, Inc.
2. Waste Unit 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988 -02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

- Monitoring Well (PWBU)
- Monitoring Well (RLWBU)
- Monitoring Well (SAWBU)
- Building
- Above Ground Storage Tanks
- Former Waste Solidification Unit
- Leachate Pond
- Cattle Pen Area
- Road/ Trail
- Surveyed Waste Unit (Approx.)
- Waste Unit (Approx.)[2, 3]
- Waste Unit (Approx.)[2, 3]
- PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 200 Feet

Historical Monitoring Well Locations

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

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Figure 17

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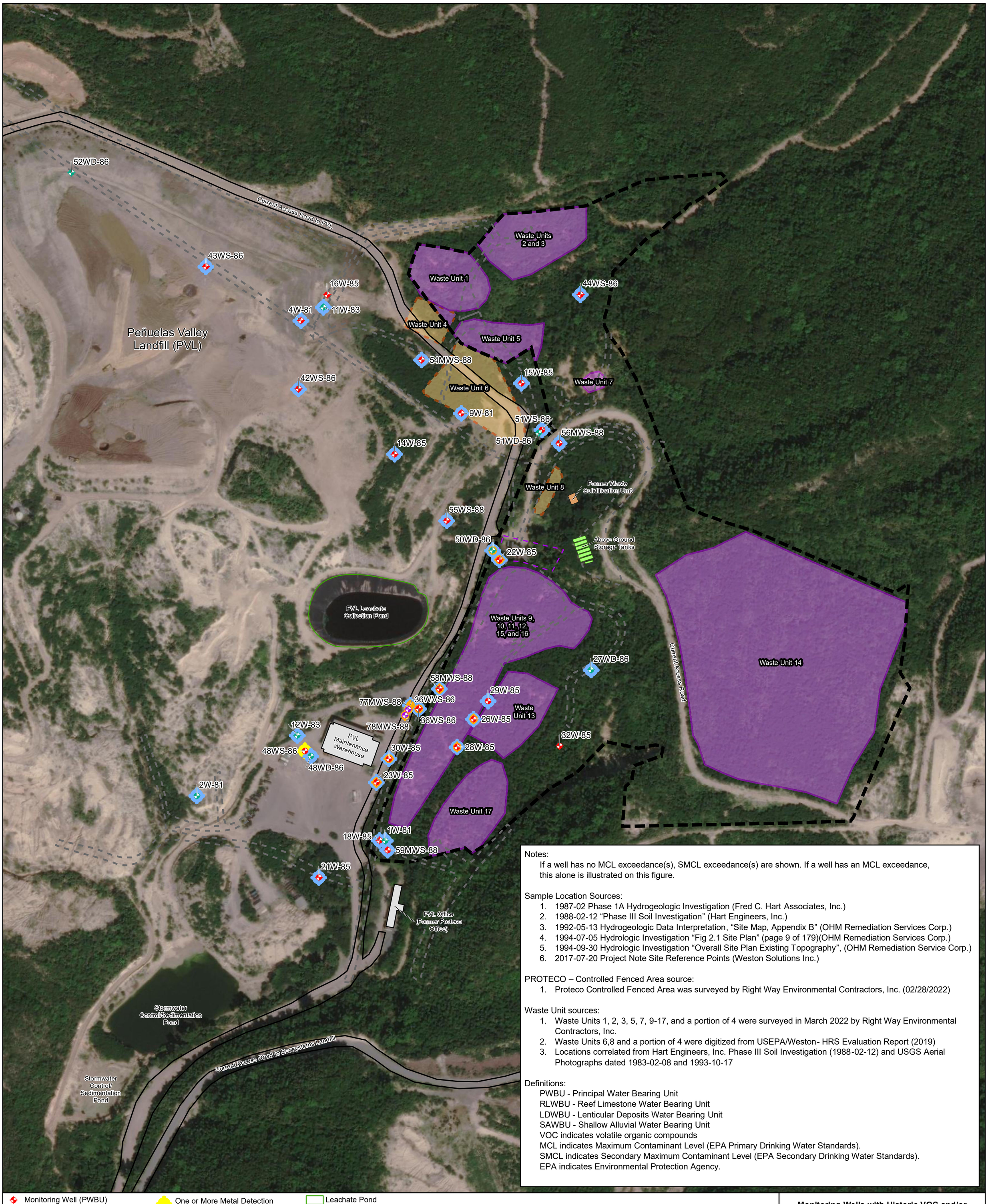

Notes:

If a well has no MCL exceedance(s), SMCL exceedance(s) are shown. If a well has an MCL exceedance, this alone is illustrated on this figure.

Sample Location Sources:

1. 1987-02 Phase 1A Hydrogeologic Investigation (Fred C. Hart Associates, Inc.)
2. 1988-02-12 “Phase III Soil Investigation” (Hart Engineers, Inc.)
3. 1992-05-13 Hydrogeologic Data Interpretation, “Site Map, Appendix B” (OHM Remediation Services Corp.)
4. 1994-07-05 Hydrologic Investigation “Fig 2.1 Site Plan” (page 9 of 179)(OHM Remediation Services Corp.)
5. 1994-09-30 Hydrologic Investigation “Overall Site Plan Existing Topography”, (OHM Remediation Service Corp.)
6. 2017-07-20 Project Note Site Reference Points (Weston Solutions Inc.)

PROTECO – Controlled Fenced Area source:

1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Waste Unit sources:

1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

Definitions:

PWBU - Principal Water Bearing Unit
RLWBU - Reef Limestone Water Bearing Unit
LDWBU - Lenticular Deposits Water Bearing Unit
SAWBU - Shallow Alluvial Water Bearing Unit
VOC indicates volatile organic compounds
MCL indicates Maximum Contaminant Level (EPA Primary Drinking Water Standards).
SMCL indicates Secondary Maximum Contaminant Level (EPA Secondary Drinking Water Standards).
EPA indicates Environmental Protection Agency.

- Monitoring Well (PWBU)
- Monitoring Well (RLWBU)
- Monitoring Well (SAWBU)
- One or More VOC Detection Exceeding MCL
- One or More Metal Detection Exceeding MCL
- One or More Metal Detection Exceeding SMCL
- Surveyed Waste Unit (Approx.)
- Waste Unit (Approx.)[2, 3]
- Waste Unit (Approx.)[2, 3]
- Building
- Above Ground Storage Tanks
- Former Waste Solidification Unit
- Leachate Pond
- Cattle Pen Area
- Road/ Trail
- Former Road/ Trail (1988)
- PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (10/12/2019)

N

0 200 Feet

Monitoring Wells with Historic VOC and/or Metals MCL or SMCL Exceedances

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

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Figure 18

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Cuebas 1 (Domestic – Church)

3.0 Miles

2.5 Miles

2.0 Miles

1.5 Miles

1.0 Miles

PREPA Well 13

PREPA Well 9

PREPA Well 10

North Seboruco 10 (Irrigation)

Tallaboa Saliente 8 (Domestic)

Tallaboa Saliente 9 (Domestic)

Tallaboa Poniente

Seboruco Community

Tallaboa Saliente

PR-385

PR-384

Rio Tallaboa

Map Extent

Notes:
Well Location source:
1. Removal Assessment Sampling Report, Revision 3, PROTECO Site (Off-Site Wells), prepared by Removal Support Team 3, Weston Solutions, Inc., dated August 2018.
2. Servicios Carbareon and Weston Solutions, Inc.. Global Positioning System (GPS)-Recorded Site Features Site Reconnaissance (2017-07-20)

Parcel Boundaries source:
1. Portal Catastro Digital y Productos Cartográficos Centro de Recaudación de Ingresos Municipales, https://catastro.crimpr.net/cdprpc/, (2021-02-19)

PROTECO Controlled Area source:
1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02-28-2022)

Definitions:

PREPA indicates Puerto Rico Electric Power Authority
USEPA indicates the United States Environmental Protection Agency

Legend

- Off-SIte Well Sampled by EPA and Weston Solutions, Inc. on 4/26/2018
- Radius from PROTECO Controlled Fenced Area (0.5 Mile Interval)
- PROTECO - Controlled Fenced Area (Approx.)
- Parcel Boundary (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community (11/28/2020)

N

0 600 Feet

Off-Site Wells Sampled by USEPA and Weston in 2018

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

Figure 19

FR3703C | July 2022

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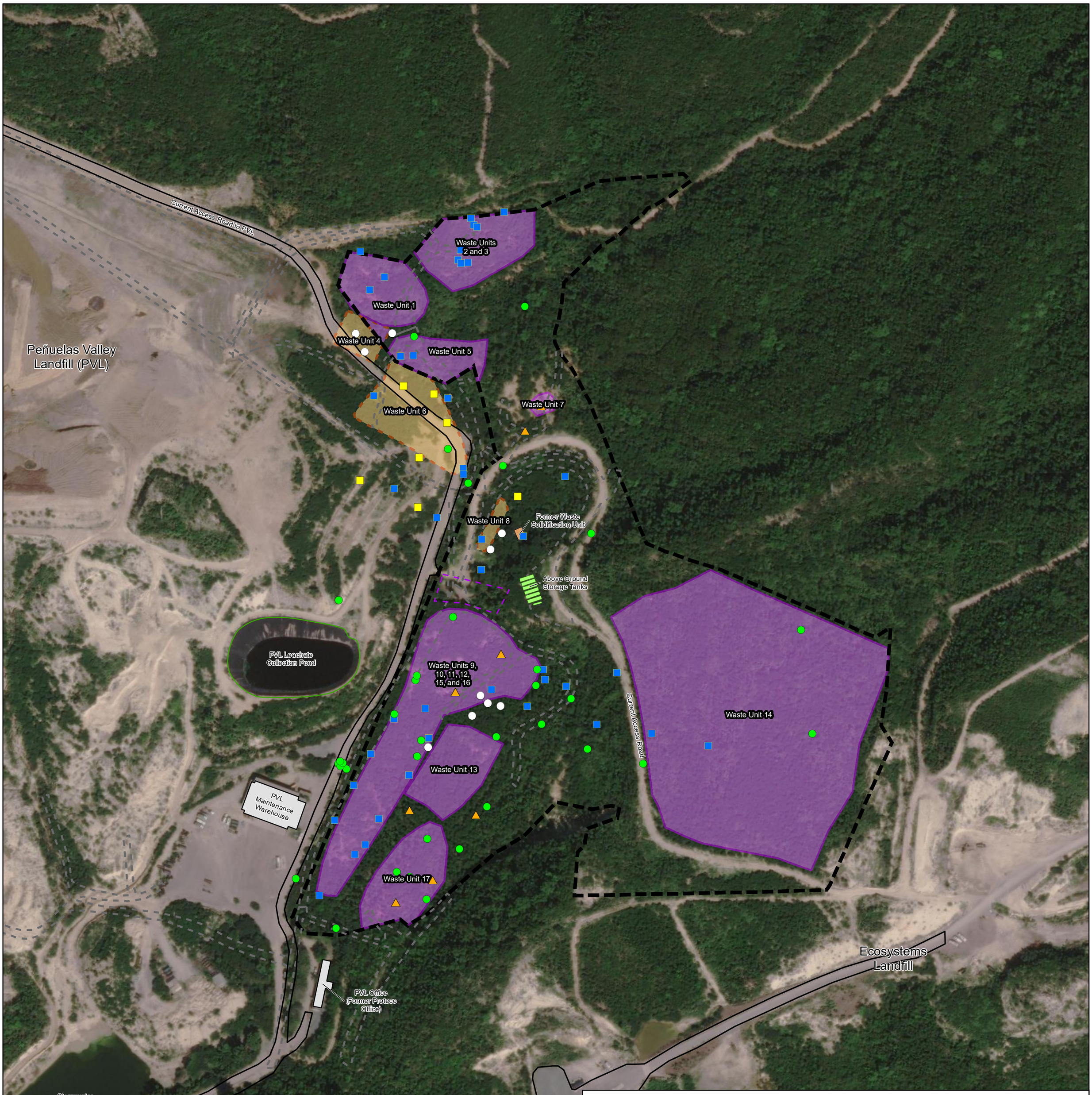

Notes:

Sample Location Sources:

1. 1987-02 Phase 1A Hydrogeologic Investigation (Fred C. Hart Associates, Inc.)
2. 1988-02-12 “Phase III Soil Investigation” (Hart Engineers, Inc.)
3. 1992-05-13 Hydrogeologic Data Interpretation, “Site Map, Appendix B” (OHM Remediation Services Corp.)
4. 1994-07-05 Hydrologic Investigation “Fig 2.1 Site Plan” (page 9 of 179)(OHM Remediation Services Corp.)
5. 1994-09-30 Hydrologic Investigation “Overall Site Plan Existing Topography”, (OHM Remediation Service Corp.)
6. 2017-07-20 Project Note Site Reference Points (Weston Solutions Inc.)

PROTECO – Controlled Fenced Area source:

1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (02/28/2022)

Waste Unit sources:

1. Waste Units 1, 2, 3, 5, 7, 9-17, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Contractors, Inc.
2. Waste Units 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

- Surface Soil Sample
- Perimeter Test Pit
- Interior Test Pit
- Run-On/Run-Off Test Pit
- Soil Boring
- Surveyed Waste Unit (Approx.)
- Waste Unit (Approx.)[2, 3]
- Waste Unit (Approx.)[2, 3]
- Building
- Above Ground Storage Tanks
- Former Waste Solidification Unit
- Leachate Pond
- Cattle Pen Area
- Road/ Trail
- Former Road/ Trail (1988)
- PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 200 Feet

Historical Soil Sampling Locations

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 20

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Waste Unit 1		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	133	mg/kg
Total Pesticides	ND	µg/kg
TPH	NA	mg/kg
Total SVOCs	3,620	µg/kg
Total VOCs	8,758	µg/kg

Waste Unit 2		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	NA	mg/kg
Total Pesticides	ND	µg/kg
TPH	NA	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	200	µg/kg

Waste Unit 3		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	NA	mg/kg
Total Pesticides	ND	µg/kg
TPH	NA	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	87	µg/kg

Waste Unit 4		
Cyanide	7.8	mg/kg
Phenolics	0.59	mg/kg
RCRA Metals	641	mg/kg
Total Pesticides	60	µg/kg
TPH	NA	mg/kg
Total SVOCs	18,000	µg/kg
Total VOCs	694	µg/kg

Waste Unit 5		
Cyanide	ND	mg/kg
Phenolics	3.0	mg/kg
RCRA Metals	3.1	mg/kg
Total Pesticides	ND	µg/kg
TPH	NA	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	5.0	µg/kg

Waste Unit 6		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	1,200	mg/kg
Total Pesticides	ND	µg/kg
TPH	1,380	mg/kg
Total SVOCs	510	µg/kg
Total VOCs	32	µg/kg

Waste Unit 7		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	180	mg/kg
Total Pesticides	ND	µg/kg
TPH	NA	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	18	µg/kg

Waste Unit 8		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	191	mg/kg
Total Pesticides	ND	µg/kg
TPH	NA	mg/kg
Total SVOCs	240	µg/kg
Total VOCs	ND	µg/kg

Waste Unit 14		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	NA	mg/kg
Total Pesticides	42,400	µg/kg
TPH	13,120	mg/kg
Total SVOCs	239,300	µg/kg
Total VOCs	462,200	µg/kg

Waste Unit 9		
Cyanide	NA	mg/kg
Phenolics	14	mg/kg
RCRA Metals	NA	mg/kg
Total Pesticides	3.3	µg/kg
TPH	NA	mg/kg
Total SVOCs	9,600	µg/kg
Total VOCs	1,093	µg/kg

Waste Unit 10		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	300	mg/kg
Total Pesticides	ND	µg/kg
TPH	NA	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	677	µg/kg

Waste Unit 11		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	200	mg/kg
Total Pesticides	309	µg/kg
TPH	434,000	mg/kg
Total SVOCs	43,790	µg/kg
Total VOCs	786,000	µg/kg

Waste Unit 12		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	120	mg/kg
Total Pesticides	4.7	µg/kg
TPH	260	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	47	µg/kg

Waste Unit 15		
Cyanide	NA	mg/kg
Phenolics	0.35	mg/kg
RCRA Metals	NA	mg/kg
Total Pesticides	34	µg/kg
TPH	367	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	484	µg/kg

Waste Unit 16		
Cyanide	NA	mg/kg
Phenolics	NA	mg/kg
RCRA Metals	226	mg/kg
Total Pesticides	12	µg/kg
TPH	188	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	618,500	µg/kg

Waste Unit 13		
Cyanide	NA	mg/kg
Phenolics	1.0	mg/kg
RCRA Metals	NA	mg/kg
Total Pesticides	ND	µg/kg
TPH	NA	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	139	µg/kg

Waste Unit 17		
Cyanide	NA	mg/kg
Phenolics	ND	mg/kg
RCRA Metals	294	mg/kg
Total Pesticides	ND	µg/kg
TPH	NA	mg/kg
Total SVOCs	ND	µg/kg
Total VOCs	20	µg/kg

Waste Units 2 and 3

Waste Unit 1

Waste Unit 4

Waste Unit 5

Waste Unit 6

Waste Unit 7

Waste Unit 8

Waste Units 9, 10, 11, 12, 15, and 16

Waste Unit 13

Waste Unit 14

Waste Unit 17

Notes:

1. The concentrations displayed represent the maximum of all the samples collected per waste unit during the Phanse III Soil Investigation (Hart Engineers, Inc, 1988).
2. Where a sample of a drum was collected, the results were not included in selection of maximum soil concentrations presented herein.
3. RCRA metals indicates 8 Resource Conservation and Recovery Act metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.
4. ND indicates not detected above laboratory method detection limits
5. NA indicates not analyzed
6. µg/kg indicates micrograms per kilogram
7. mg/kg indicates milligrams per kilogram
8. VOCs indicates volatile organic compounds
9. SVOCs indicates semi-volatile organic compounds
10. TPH indicates total petroleum hydrocarbons

Sample Location Sources:

1. 1987-02 Phase 1A Hydrogeologic Investigation (Fred C. Hart Associates, Inc.)
2. 1988-02-12 “Phase III Soil Investigation” (Hart Engineers, Inc.)
3. 1992-05-13 Hydrogeologic Data Interpretation, “Site Map, Appendix B” (OHM Remediation Services Corp.)
4. 1994-07-05 Hydrologic Investigation “Fig 2.1 Site Plan” (page 9 of 179)(OHM Remediation Services Corp.)
5. 1994-09-30 Hydrologic Investigation “Overall Site Plan Existing Topography”, (OHM Remediation Service Corp.)
6. 2017-07-20 Project Note Site Reference Points (Weston Solutions Inc.)

PROTECO – Controlled Fenced Area source:

1. Proteco Controlled Fenced Area was surveyed by Right Way Environmental Contractors, Inc. (2022-02-28)

Waste Unit sources:

1. Waste Unit 7,14,15, and a portion of 4 were surveyed in March 2022 by Right Way Environmental Constructors, Inc.
2. Waste Unit 6,8 and a portion of 4 were digitized from USEPA/Weston- HRS Evaluation Report (2019)
3. Locations correlated from Hart Engineers, Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photographs dated 1983-02-08 and 1993-10-17

- Surface Soil Sample
- Perimeter Test Pit
- Interior Test Pit
- Run-On/Run-Off Test Pit
- Soil Boring
- Surveyed Waste Unit (Approx.)
- Waste Unit (Approx.)[2, 3]
- Waste Unit (Approx.)[2, 3]
- PROTECO - Controlled Fenced Area (Approx.)

Aerial Imagery Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community (11/28/2020)

N

0 200 Feet

Maximum Historical Soil Concentrations

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure 21

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ATTACHMENTS

ATTACHMENT A

ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 2

IN THE MATTER OF: PROTECO Superfund Site Peñuelas, Puerto Rico Respondents (see Appendix A), Respondents. Proceeding Under Sections 104, 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9604, 9607 and 9622.	Index Number: CERCLA-02-2020-2010

ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT FOR REMEDIAL INVESTIGATION / FEASIBILITY STUDY

TABLE OF CONTENTS

I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent ("Settlement") is entered into voluntarily by the United States Environmental Protection Agency ("EPA") and the Respondents identified in the attached Appendix A ("Respondents"). This Settlement provides for the performance of a remedial investigation and feasibility study ("RI/FS") by Respondents and the payment of certain response costs incurred by the United States at or in connection with the PROTECO site (the "Site") generally located at Road 385, Km 4.4, Bo. Tallaboa in Peñuelas, Puerto Rico.

2. This Settlement is issued under the authority vested in the President of the United States by Sections 104, 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9607 and 9622 ("CERCLA"). This authority was delegated to the Administrator of EPA on January 23, 1987, by Executive Order 12580, 52 Fed. Reg. 2923 (Jan. 29, 1987), and further delegated to Regional Administrators by EPA Delegation Nos. 14-14C (Administrative Actions Through Consent Orders, Jan. 18, 2017) and 14-14D (Cost Recovery Non-Judicial Agreements and Administrative Consent Orders, Jan. 18, 2017). These authorities were further redelegated by the Regional Administrator of EPA Region 2 to the Director of the Superfund and Emergency Management Division by Region 2 Redelegation R-1200 dated January 29, 2017.

3. EPA and Respondents recognize that this Settlement has been negotiated in good faith and that the actions undertaken by Respondents in accordance with this Settlement do not constitute an admission of any liability. Respondents do not admit, and retain the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement, the validity of the findings of facts, conclusions of law, and determinations in Section IV (Findings of Fact) and V (Conclusions of Law and Determinations) of this Settlement. Respondents agree to comply with and be bound by the terms of this Settlement and further agree that they will not contest the basis or validity of this Settlement or its terms.

II. PARTIES BOUND

4. This Settlement is binding upon EPA and upon Respondents and their agents, successors, and assigns. Any change in ownership or corporate status of any Respondent, including any transfer of assets or real or personal property, shall not alter such Respondent's responsibilities under this Settlement.

5. Respondents are jointly and severally liable for carrying out all activities required by this Settlement. In the event of the insolvency or other failure of any one or more Respondents to implement the requirements of this Settlement, the remaining Respondents shall complete all such requirements.

6. Each undersigned representative of a Respondent certifies that he or she is fully authorized to enter into the terms and conditions of this Settlement and to execute and legally bind that Respondent to this Settlement.

7. Respondents shall provide a copy of this Settlement to each contractor hired to perform the Work required by this Settlement and to each person representing any Respondents with respect to the Site or the Work, and shall condition all contracts entered into under this Settlement upon performance of the Work in conformity with the terms of this Settlement. Respondents or their contractors shall provide written notice of the Settlement to all subcontractors hired to perform any portion of the Work required by this Settlement. Respondents shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work in accordance with the terms of this Settlement.

III. DEFINITIONS

8. Unless otherwise expressly provided in this Settlement, terms used in this Settlement that are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement or its attached appendices, the following definitions shall apply:

a. "Affected Property" shall mean all real property at the Site and any other real property where EPA determines, at any time, that access is needed to implement the RI/FS, including the 35-acre estate located at Road 385, Km 4.4, Bo. Tallaboa in Peñuelas, Puerto Rico.

b. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675.

c. "Commonwealth" shall mean the Commonwealth of Puerto Rico.

d. "Day" or "day" shall mean a calendar day. In computing any period of time under this Settlement, where the last day would fall on a Saturday, Sunday, or federal or Commonwealth holiday, the period shall run until the close of business of the next working day.

e. "Effective Date" shall mean the effective date of this Settlement as provided in Section XXXII.

f. "EPA" shall mean the United States Environmental Protection Agency and its successor departments, agencies, or instrumentalities.

g. "EPA Hazardous Substance Superfund" shall mean the Hazardous Substance Superfund established by the Internal Revenue Code, 26 U.S.C. § 9507.

h. "Future Response Costs" shall mean all costs, including direct and indirect costs, that the United States incurs after the Effective Date in reviewing or developing deliverables submitted pursuant to this Settlement, in overseeing implementation of the Work, or otherwise implementing, overseeing, or enforcing this Settlement, including payroll costs, contractor costs, travel costs, laboratory costs, the costs incurred pursuant to Section XI (Property Requirements) (including cost of attorney time and any monies paid to secure or enforce access, including the amount of just compensation), Section XV (Emergency Response

and Notification of Releases), Paragraph 87 (Work Takeover), Paragraph 112 (Access to Financial Assurance), community involvement, (including the costs of any technical assistance grant under Section 117(e) of CERCLA, 42 U.S.C. § 9617(e)), Section XVII (Dispute Resolution), and all litigation costs related to this Settlement.

i. "Interest" shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year. Rates are available online at https://www.epa.gov/superfund/superfund-interest-rates.

j. "Material Defect" shall mean a substantial defect in a submission such that the submission fails to adequately address one or more requirements under CERCLA, EPA guidance, and/or this Settlement.

k. "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

l. "Owner" shall mean any person or entity that owns or controls any Affected Property.

m. "Paragraph" shall mean a portion of this Settlement identified by an Arabic numeral or an upper or lower case letter.

n. "Party" or "Parties" shall mean EPA or any Respondent or EPA and Respondents, respectively.

o. "Post-Closure Trust Fund" shall mean the trust fund required under the November 20, 1997 amended consent decree in *United States v. Proteccion Tecnica Ecologica, Inc., et. al.*, Civil Action No. 86-1698 (HL), and established pursuant to a May 1998 Trust Agreement for the purpose of funding post-closure activities at the Site.

p. "PRDENR" shall mean the Puerto Rico Department of Environment & Natural Resources and any predecessor or successor departments or agencies of the Commonwealth.

q. "PROTECO Site Special Account" shall mean the special account within the EPA Hazardous Substance Superfund, established for the Site by EPA pursuant to Section 122(b)(3) of CERCLA, 42 U.S.C. § 9622(b)(3).

r. "RCRA" shall mean the Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992 (also known as the Resource Conservation and Recovery Act).

s. "Respondents" shall mean those Parties identified in Appendix A, which may be amended to include additional Parties.

t. “Section” shall mean a portion of this Settlement identified by a Roman numeral.

u. “Settlement” shall mean this Administrative Settlement Agreement and Order on Consent, Index Number 02-2020-2010, and all appendices attached hereto (listed in Section XXX (Integration/Appendices)). In the event of conflict between this Settlement and any appendix, this Settlement shall control.

v. “Site” shall mean the PROTECO Superfund Site, including approximately 35 acres, located at Road 385, Km 4.4, Bo. Tallaboa in Peñuelas, Puerto Rico, and depicted generally on the map attached as Appendix B.

w. “Statement of Work” or “SOW” shall mean the document describing the activities Respondents must perform to develop the RI/FS for “the Site”, as set forth in Appendix C to this Settlement. The Statement of Work is incorporated into this Settlement and is an enforceable part of this Settlement as are any modifications made thereto in accordance with this Settlement.

x. “Transfer” shall mean to sell, assign, convey, lease, mortgage, or grant a security interest in, or where used as a noun, a sale, assignment, conveyance, or other disposition of any interest by operation of law or otherwise.

y. “Trust Agreement” shall mean the May 1998 agreement entered into between Resources Management, Inc. d/b/a Proteccion Tecnica Ecologica, Inc. (“PROTECO”), as the grantor, and Banco Santander de Puerto Rico, as the trustee, that establishes and governs the Post-Closure Trust Fund to fund post-closure activities at the Site. On December 22, 2006, Banco Santander de Puerto Rico resigned as trustee, and Banco Popular de Puerto Rico became the successor trustee for the Trust Agreement.

z. “United States” shall mean the United States of America and each department, agency, and instrumentality of the United States, including EPA.

aa. “Waste Material” shall mean (a) any “hazardous substance” under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); (b) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); and (c) any “solid waste” under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

bb. “Work” shall mean all activities and obligations Respondents are required to perform under this Settlement, except those required by Section XIII (Record Retention).

IV. EPA’S FINDINGS OF FACT

9. The Site is located at Road 385, Km 4.4, Bo. Tallaboa, Peñuelas, Puerto Rico. The Site is the location of a former hazardous waste treatment, storage, and disposal facility (“TSDF”) that occupies approximately thirty-five (35) acres in a valley surrounded by undeveloped, vegetated hills east of the Río Tallaboa valley. Two separate, active non-hazardous

industrial waste landfills regulated under Subtitle D of the Resource Conservation and Recovery Act ("RCRA") border the property to the east and west. The Seboruco residential area lies approximately 1.5 miles to the west. There are several private, domestic, industrial, and agricultural wells located within a two-mile radius of the Site.

10. Operations at the TSDF began in 1975 under the name Servicios Carbareon, Inc.; in 1985, the name was changed to Protección Técnica Ecológica Corp., which was succeeded by Resources Management, Inc. (hereinafter, "PROTECO"). During its years of operation, the TSDF accepted a variety of wastes, including electroplating sludge, wastewater treatment plant sludge, slurries, petroleum wastes, pesticide wastes, and pharmaceutical and manufacturing wastes. A variety of RCRA characteristic and listed hazardous wastes, including spent halogenated and non-halogenated solvent wastes, also known as volatile organic compounds ("VOCs") (RCRA Waste Codes F001, F002, F003, and F005) and wastes containing mercury (RCRA Waste Code D009), were deposited in one or more of 17 unlined waste units.

11. Drums brought to the former TSDF were either stored directly on the ground surface, were buried in the ground, or had their contents transferred to surface impoundments for treatment. Throughout the years, inspections of the TSDF conducted by EPA and PRDENR revealed violations of federal and Commonwealth environmental regulations, including unpermitted waste disposal activity, inadequate groundwater monitoring, lack of runoff control, waste deposition in unlined waste units, corroded and improperly labeled drums leaking contents onto exposed soil, and mixing of potentially incompatible wastes. Evidence of vertical and horizontal seepage from waste units was observed.

12. In November 1980, PROTECO submitted a Part A Permit Application pursuant to RCRA, thus entering interim status. In 1987, EPA and PROTECO entered into a consent decree stipulating that PROTECO would perform injunctive relief with respect to RCRA violations. In November 1997, after it became apparent that PROTECO had continued to violate RCRA regulations and provisions of the 1987 consent decree, EPA and PROTECO entered into an amended consent decree requiring the TSDF to meet RCRA closure and post-closure care requirements. The amended consent decree required establishment of the Post-Closure Trust Fund, which was established for the benefit of EPA pursuant to the Trust Agreement. PROTECO conducted closure of waste units from November 1997 to February 1999; some waste units were closed in place by capping, while others were excavated for disposal into a corrective action management unit at the facility. On June 29, 1999, EPA approved PROTECO's Closure Plan Certification.

13. PROTECO conducted some post-closure maintenance but stopped performing any post-closure care by 2009. Since then, EPA inspectors have confirmed that PROTECO is not maintaining the Site and is out of compliance with post-closure care provisions of the amended consent decree. In particular, PROTECO strongly opposed conducting post-closure groundwater monitoring and has not performed any of the RCRA-required groundwater monitoring activities. The Site still does not have a groundwater monitoring system as required for hazardous waste facilities closed with waste in place, despite EPA's repeated efforts to compel these actions.

14. Analytical results for groundwater monitoring wells at the Site indicate the presence of elevated concentrations of mercury and VOCs, including 1,1-Dichloroethane ("1,1-DCA"), 1,2-Dichloroethane ("1,2-DCA"), 1,1-Dichloroethylene ("1,1-DCE"), Trans-1,2-Dichloroethylene ("trans-1,2-DCE"), Tetrachloroethylene ("PCE"), 1,1,1-Trichloroethane ("1,1,1-TCA"), and Trichloroethylene ("TCE"). Sampling of on-site monitoring wells and hydrogeological studies indicate that VOC contamination has migrated to the aquifer beneath the Site. There are public and domestic drinking water supply wells, as well as groundwater springs that have been used for drinking water supply in the Río Tallaboa valley west of the Site.

15. Mercury, 1,1-DCA, 1,2-DCA, 1,1-DCE, trans-1,2-DCE, PCE, 1,1,1-TCA, and TCE are "hazardous substances" within the meaning of Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

16. The discharge, dumping, and/or disposal of hazardous substances at the Site constitutes a "release" of hazardous substances into the environment as the term "release" is defined in Section 101(22) of CERCLA, 42 U.S.C. § 9601(22). In addition, there is a threat of further releases of hazardous substances at and from the Site.

17. Exposure to the various hazardous substances present at the Site may cause a variety of adverse human health effects.

18. There is a threat of migration of the hazardous substances present at the Site that might further impact groundwater, surface water, and the surrounding environment.

19. The Site was listed on the National Priorities List by EPA pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, on May 15, 2019, 84 Fed. Reg. 21708.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

20. For purposes of this Settlement, and based on EPA's Findings of Fact set forth above, and the administrative record, EPA has determined that:

a. The Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found at the Site, as identified in the Findings of Fact above, includes "hazardous substances" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. Each Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. Each Respondent identified in the attached Appendix A is a potentially responsible party as described in Section 107(a) of CERCLA, 42 U.S.C. § 9607(a).

e. Each Respondent allegedly arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment of hazardous substances at the facility, within the meaning of Section 107(a)(3) of CERCLA, 42 U.S.C. § 9607(a)(3).

f. The conditions described in the Findings of Fact above constitute an actual and/or threatened "release" of a hazardous substance from a facility as defined by Section 101(22) of CERCLA, 42 U.S.C. § 9601(22).

g. The actions required by this Settlement are necessary to protect the public health, welfare, or the environment, are in the public interest, 42 U.S.C. § 9622(a), are consistent with CERCLA and the NCP, 42 U.S.C. §§ 9604(a)(1), 9622(a), and will expedite effective remedial action and minimize litigation, 42 U.S.C. § 9622(a).

h. EPA has determined that Respondents are qualified to conduct the RI/FS within the meaning of Section 104(a) of CERCLA, 42 U.S.C. § 9604(a), and will carry out the Work properly and promptly, in accordance with Sections 104(a) and 122(a) of CERCLA, 42 U.S.C. §§ 9604(a) and 9622(a), and, if carried out in compliance with the terms of this Settlement, the Work will be consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP, 40 C.F.R. § 300.700(c)(3)(ii).

VI. SETTLEMENT AGREEMENT AND ORDER

21. Based upon the Findings of Fact, Conclusions of Law and Determinations set forth above, and the administrative record, it is hereby Ordered and Agreed that Respondents shall comply with all provisions of this Settlement, including all appendices to this Settlement and all documents incorporated by reference into this Settlement.

VII. DESIGNATION OF CONTRACTORS AND PROJECT COORDINATORS

22. **Selection of Contractors, Personnel**. All Work performed under this Settlement shall be under the direction and supervision of qualified personnel. Within thirty (30) days after the Effective Date, and before the Work outlined below begins, Respondents shall notify EPA in writing of the names, titles, addresses, telephone numbers, email addresses, and qualifications of the personnel, including contractors, subcontractors, consultants, and laboratories to be used in carrying out such Work. If, after the commencement of Work, Respondents retain additional contractors or subcontractors, Respondents shall notify EPA of the names, titles, contact information, and qualifications of such contractors or subcontractors retained to perform the Work at least ten (10) days prior to commencement of Work by such additional contractors or subcontractors. EPA retains the right to disapprove of any or all of the contractors and/or subcontractors retained by Respondents. If EPA disapproves of a selected contractor or subcontractor, Respondents shall retain a different contractor or subcontractor and shall notify EPA of that contractor's or subcontractor's name, title, contact information, and qualifications within thirty (30) days after receipt of written notice of EPA's disapproval. With respect to any proposed contractor, Respondents shall demonstrate that the proposed contractor demonstrates compliance with ASQ/ANSI E4:2014 "Quality management systems for environmental information and technology programs – Requirements with guidance for use" (American Society

for Quality, February 2014), by submitting a copy of the proposed contractor's Quality Management Plan ("QMP"). The QMP should be prepared in accordance with "EPA Requirements for Quality Management Plans (QA/R-2)," EPA/240/B-01/002 (Reissued May 2006) or equivalent documentation as determined by EPA. The qualifications of the persons undertaking the Work for Respondents shall be subject to EPA's review for verification based on objective assessment criteria (e.g., experience, capacity, technical expertise) and that they do not have a conflict of interest with respect to the project.

23. Within thirty (30) days after the Effective Date, Respondents shall designate a project coordinator who shall be responsible for administration of the Work required by this Settlement ("Project Coordinator") and shall submit to EPA the proposed designated Project Coordinator's name, title, address, telephone number, email address, and qualifications. To the extent possible, the Project Coordinator shall be present on Site or readily available during the Work. EPA retains the right to disapprove of a designated Project Coordinator who does not meet the requirements of Paragraph 22 (Selection of Contractors, Personnel). If EPA disapproves of the designated Project Coordinator, Respondents shall retain a different Project Coordinator and shall notify EPA of that person's name, title, contact information, and qualifications within twenty (20) days following receipt of written notice of EPA's disapproval. Notice or communication relating to this Settlement from EPA to Respondents' Project Coordinator shall constitute notice or communication to all Respondents.

24. EPA has designated Zolymar Luna of the Response and Remediation Branch, Region 2 as its project manager ("Project Manager"). EPA will notify Respondents in writing of a change of its designated Project Manager, and EPA will provide Respondents with the new EPA Project Manager's name, title, address, telephone number, email address. Communications between Respondents and EPA, and all documents concerning the activities performed pursuant to this Settlement, shall be directed to the EPA Project Manager in accordance with Paragraph 34.a.

25. EPA's Project Manager shall have the authority lawfully vested in a Remedial Project Manager and On-Scene Coordinator by the NCP. In addition, EPA's Project Manager shall have the authority, consistent with the NCP, to halt, conduct, or direct any Work required by this Settlement, or to direct any other response action when s/he determines that conditions at the Site constitute an emergency situation or may present a threat to public health or welfare or the environment. Absence of the EPA Project Manager from the area under study pursuant to this Settlement shall not be cause for stoppage or delay of Work.

VIII. WORK TO BE PERFORMED

26. For any regulation or guidance referenced in the Settlement, the reference will be read to include any subsequent modification, amendment, or replacement of such regulation or guidance. Such modifications, amendments, or replacements apply to the Work only after Respondents receive notification from EPA of the modification, amendment, or replacement.

27. Respondents shall conduct the RI/FS and prepare all plans in accordance with the provisions of this Settlement, the attached SOW, CERCLA, the NCP, and EPA guidance,

including the "Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" ("RI/FS Guidance"), OSWER Directive # 9355.3-01 (October 1988), available at https://semspub.epa.gov/src/document/11/128301, "Guidance for Data Useability in Risk Assessment (Part A), Final," OSWER Directive #9285.7-09A, PB 92-963356 (April 1992), available at http://semspub.epa.gov/src/document/11/156756, and guidance referenced therein, and guidance referenced in the SOW.

a. The Remedial Investigation ("RI") shall consist of collecting data to characterize site conditions, determining the nature and extent of the contamination at or from the Site, assessing risk to human health and the environment, and conducting treatability testing as necessary to evaluate the potential performance and cost of the treatment technologies that are being considered. It is the intention of EPA and Respondents that the RI will be performed, to the extent technically feasible, in a manner that will prevent and/or minimize releases of hazardous substances from the Site and from the corrective measures implemented as part of the RCRA closure conducted pursuant to an EPA-approved closure plan.

b. The Feasibility Study ("FS") shall determine and evaluate (based on treatability testing, where appropriate) alternatives for remedial action to prevent, mitigate, or otherwise respond to or remedy the release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site. The alternatives evaluated must include the range of alternatives described in the NCP, 40 C.F.R. § 300.430(e), and shall include remedial actions that utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In evaluating the alternatives, Respondents shall address the factors required to be taken into account by Section 121 of CERCLA, 42 U.S.C. § 9621, and 40 C.F.R. § 300.430(e).

28. All written documents prepared by Respondents pursuant to this Settlement shall be submitted by Respondents in accordance with Section IX (Submission and Approval of Deliverables). With the exception of progress reports and the Health and Safety Plan, all such submittals will be reviewed and approved by EPA in accordance with Section IX (Submission and Approval of Deliverables). Respondents shall implement all EPA approved, conditionally-approved, or modified deliverables.

29. Upon receipt of the draft Feasibility Study Report ("FS Report"), EPA will evaluate, as necessary, the estimates of the risk to the public and environment that are expected to remain after a particular remedial alternative has been completed and will evaluate the cost, implementability, and long-term effectiveness of any proposed institutional controls for that alternative.

30. **Modification of the RI/FS Work Plan**

a. If at any time during the RI/FS process, Respondents identify a need for additional data, Respondents shall submit to EPA's Project Manager for approval a memorandum documenting the need for a modification of the RI/FS Work Plan within thirty (30) days of determining a modification is necessary. EPA in its discretion will approve or disapprove the proposed RI/FS Work Plan modification(s).

b. In the event of unanticipated or changed circumstances at the Site that may warrant changes to the RI/FS Work Plan, Respondents shall notify EPA's Project Manager by telephone and electronic mail within 24 hours of discovery of the unanticipated or changed circumstances. In the event that EPA determines that the unanticipated or changed circumstances warrant changes in the RI/FS Work Plan, EPA shall direct Respondents to modify and submit the modified RI/FS Work Plan to EPA for approval. If EPA is not satisfied with the revised RI/FS Work Plan, EPA reserves the right to modify it unilaterally. Respondents shall perform the RI/FS Work Plan as modified.

c. In the event that EPA determines that, in addition to tasks defined in the initially approved RI/FS Work Plan, other additional work may be necessary to accomplish the objectives of the RI/FS, EPA will notify Respondents and provide Respondents an opportunity for a consultation with EPA to take place within ten (10) days after the EPA notification. After such consultation, if EPA still considers additional work to be necessary to accomplish the objectives of the RI/FS, EPA will notify Respondents of its determination and request that Respondents submit a written modification to the RI/FS Work Plan. Respondents shall indicate their willingness to perform the additional work within ten (10) days after receipt of the EPA request and shall submit a written modification to the RI/FS Work Plan within thirty (30) days of the EPA request. Respondents shall perform these response actions in addition to those required by the initially approved RI/FS Work Plan. If Respondents object to any modification determined by EPA to be necessary pursuant to this Paragraph, Respondents may seek dispute resolution pursuant to Section XVII (Dispute Resolution). The SOW and/or RI/FS Work Plan shall be modified in accordance with the final resolution of the dispute.

d. Respondents shall complete the additional work according to the standards, specifications, and schedule set forth or approved by EPA in a written modification to the RI/FS Work Plan or written RI/FS Work Plan supplement. EPA reserves the right to conduct the additional work itself, to seek reimbursement from Respondents for the costs incurred in performing the work, and/or to seek any other appropriate relief.

e. Notwithstanding the above, EPA and Respondents agree that any EPA modifications to the RI/FS Work Plan shall not require Respondents to investigate releases or contamination unrelated to the Site.

f. Nothing in this Paragraph shall be construed to limit EPA's authority to require performance of further response actions at the Site.

31. **Off-Site Shipments**

a. Respondents may ship hazardous substances, pollutants, and contaminants from the Site to an off-Site facility only if that facility complies with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondents will be deemed to be in compliance with CERCLA § 121(d)(3) and 40 C.F.R. § 300.440 regarding a shipment if Respondents obtain a prior determination from EPA that the proposed receiving facility for such shipment is acceptable under the criteria of 40 C.F.R. § 300.440(b).

b. Respondents may ship Waste Material from the Site to an out-of-state waste management facility only if, prior to any shipment, they provide written notice to the appropriate state environmental official in the receiving facility's state and to EPA's Project Manager. This notice requirement shall not apply to any off-Site shipments when the total quantity of all such shipments will not exceed ten cubic yards. The written notice must include the following information, if available: (1) the name and location of the receiving facility; (2) the type and quantity of Waste Material to be shipped; (3) the schedule for the shipment; and (4) the method of transportation. In these instances, Respondents shall also notify the state environmental official referenced above and EPA's Project Manager of any major changes in the shipment plan, such as a decision to ship the Waste Material to a different out-of-state facility.

c. Respondents may ship investigation derived waste ("IDW") from the Site to an off-Site facility only if they comply with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3), 40 C.F.R. § 300.440, EPA's "Guide to Management of Investigation Derived Waste," OSWER 9345.3-03FS (Jan. 1992), and any IDW-specific requirements contained in the SOW. Wastes shipped off-Site to a laboratory for characterization, and RCRA hazardous wastes that meet the requirements for an exemption from RCRA under 40 C.F.R. § 261.4(e) that are shipped off-Site for treatability studies are not subject to 40 C.F.R. § 300.440.

32. **Meetings**. Respondents or their designated Project Coordinator shall make presentations at, and participate in, meetings at the request of EPA during the preparation of the RI/FS. In addition to discussion of the technical aspects of the RI/FS, topics will include anticipated problems or new issues. Such meetings will be scheduled at EPA's discretion at mutually convenient times.

33. **Progress Reports**. In addition to the deliverables set forth in this Settlement, Respondents shall submit written quarterly progress reports to EPA by the fifteenth (15^{th}) day of the following month for every quarter following the Effective Date of this Settlement. At a minimum, with respect to the preceding quarter, these progress reports shall:

a. describe the actions that have been taken to comply with this Settlement;

b. include all results of sampling and tests and all other data received by Respondents, unless the data has otherwise been submitted to EPA as required by the SOW;

c. describe Work planned for the next quarter with schedules relating such Work to the overall project schedule for RI/FS completion; and

d. describe all problems encountered in complying with the requirements of this Settlement and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated problems or delays.

IX. SUBMISSION AND APPROVAL OF DELIVERABLES

34. **Submission of Deliverables**

a. **General Requirements for Deliverables**

(1) Except as otherwise provided in this Settlement, Respondents shall direct all submissions required by this Settlement to EPA's Project Manager, Zolymar Luna, U.S. Environmental Protection Agency, Caribbean Environmental Protection Division, City View Plaza II, Suite 7000, #48 Rd 165, km 1.2 Guaynabo, Puerto Rico 00968-8069, 787-977-5844, luna.zolymar@epa.gov and to the EPA Site Attorney, Andrea Leshak, U.S. Environmental Protection Agency, Region 2, Office of Regional Counsel, 290 Broadway, 17th Floor, New York, NY 10007, 212-637-3197, leshak.andrea@epa.gov. Respondents shall submit all deliverables required by this Settlement, the attached SOW, or any approved work plan in accordance with the schedule set forth in such plan.

(2) Respondents shall submit all deliverables in electronic form. Technical specifications for sampling and monitoring data and spatial data are addressed in Paragraph 34.b. All other deliverables shall be submitted in the electronic form specified by EPA's Project Manager. If any deliverable includes maps, drawings, or other exhibits that are larger than 8.5 x 11 inches, Respondents shall also provide two paper copies of such exhibits.

b. **Technical Specifications for Deliverables**

(1) Sampling and monitoring data should be submitted in standard regional Electronic Data Deliverable ("EDD") format (information available at https://www.epa.gov/superfund/region-2-superfund-electronic-data-submission). Other delivery methods may be allowed if electronic direct submission presents a significant burden or as technology changes.

(2) Spatial data, including spatially-referenced data and geospatial data, should be submitted: (i) in the ESRI File Geodatabase format; and (ii) as unprojected geographic coordinates in decimal degree format using North American Datum 1983 (NAD83) or World Geodetic System 1984 (WGS84) as the datum. If applicable, submissions should include the collection method(s). Projected coordinates may optionally be included but must be documented. Spatial data should be accompanied by metadata, and such metadata should be compliant with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata and its EPA profile, the EPA Geospatial Metadata Technical Specification. An add-on metadata editor for ESRI software, the EPA Metadata Editor (EME), complies with these FGDC and EPA metadata requirements and is available at https://edg.epa.gov/EME/.

(3) Each file must include an attribute name for each site unit or sub-unit submitted. Consult https://www.epa.gov/geospatial/geospatial-policies-and-standards for any further available guidance on attribute identification and naming.

(4) Spatial data submitted by Respondents does not and is not intended to define the boundaries of the Site.

35. **Approval of Deliverables**

a. **Initial Submissions**

(1) After review of any deliverable that is required to be submitted for EPA approval under this Settlement or the attached SOW, EPA shall (i) approve, in whole or in part, the submission; (ii) approve the submission upon specified conditions; (iii) disapprove, in whole or in part, the submission; or (iv) any combination of the foregoing.

(2) EPA also may modify the initial submission to cure deficiencies in the submission if (i) EPA determines that disapproving the submission and awaiting a resubmission would cause substantial disruption to the Work; or (ii) previous submission(s) have been disapproved as a result of Material Defects and the deficiencies in the initial submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

b. **Resubmissions**. Upon receipt of a notice of disapproval under Paragraph 35.a(1) (Initial Submissions), or if required by a notice of approval upon specified conditions under Paragraph 35.a(1), Respondents shall, within thirty (30) days or such longer time as specified by EPA in such notice, or otherwise agreed upon by the Parties, correct the deficiencies and resubmit the deliverable for approval. After review of the resubmitted deliverable, EPA may (a) approve, in whole or in part, the resubmission; (b) approve the resubmission upon specified conditions; (c) modify the resubmission; (d) disapprove, in whole or in part, the resubmission, requiring Respondents to correct the deficiencies; or (e) any combination of the foregoing.

c. **Implementation**. Upon approval, approval upon conditions, or modification by EPA under Paragraph 35.a (Initial Submissions) or Paragraph 35.b (Resubmissions) of any deliverable, or any portion thereof (i) such deliverable, or portion thereof, will be incorporated into and enforceable under the Settlement and (ii) Respondents shall take any action required by such deliverable, or portion thereof. Implementation of any non-deficient portion of a submission shall not relieve Respondents of any liability for penalties under Section XIX (Stipulated Penalties) for violations of this Settlement.

36. Notwithstanding the receipt of a notice of disapproval, Respondents shall proceed to take any action required by any non-deficient portion of the submission, unless otherwise directed by EPA.

37. In the event that EPA takes over some of the tasks in accordance with the provisions of Paragraph 87 (Work Takeover), but not the preparation of the Remedial Investigation Report ("RI Report") or the FS Report, Respondents shall incorporate and integrate information supplied by EPA into those reports.

38. Respondents shall not proceed with any activities or tasks dependent on the following deliverables until receiving EPA approval, approval on condition, or modification of such deliverables: RI/FS Work Plan; Sampling and Analysis Plan; draft RI Report; Treatability Testing Work Plan; Treatability Testing Sampling and Analysis Plan; Treatability Testing Health and Safety Plan; and draft FS Report. While awaiting EPA approval, approval on condition, or modification of these deliverables, Respondents shall proceed with all other tasks and activities that may be conducted independently of these deliverables, in accordance with the schedule set forth under this Settlement.

39. For all remaining deliverables not listed in Paragraph 38, Respondents shall proceed with all subsequent tasks, activities, and deliverables without awaiting EPA approval of the submitted deliverable. EPA reserves the right to direct Respondents to cease from proceeding further, either temporarily or permanently, on any task, activity, or deliverable at any time during the Work.

40. **Material Defects**. If an initially submitted or resubmitted plan, report, or other deliverable contains a Material Defect, and the plan, report, or other deliverable is disapproved or modified by EPA under Paragraph 35.a (Initial Submissions) or 35.b (Resubmissions) as a result of such Material Defect, Respondents shall be deemed in violation of this Settlement for failure to submit such plan, report, or other deliverable timely and adequately. Respondents may be subject to penalties for such violation as provided in Section XIX (Stipulated Penalties).

41. Neither failure of EPA to approve or disapprove of Respondents' submissions within a specified time period, nor the absence of comments, shall be construed as approval by EPA.

X. QUALITY ASSURANCE, SAMPLING, AND DATA ANALYSIS

42. Respondents shall use quality assurance, quality control, and other technical activities and chain of custody procedures for all samples consistent with "EPA Requirements for Quality Assurance Project Plans (QA/R5)," EPA/240/B-01/003 (March 2001, reissued May 2006), "Guidance for Quality Assurance Project Plans (QA/G-5)," EPA/240/R-02/009 (December 2002), and "Uniform Federal Policy for Quality Assurance Project Plans, Parts 1-3, EPA/505/B-04/900A-900C (March 2005).

43. **Laboratories**

a. Respondents shall ensure that EPA personnel and its authorized representatives are allowed access at reasonable times to all laboratories utilized by Respondents pursuant to this Settlement. In addition, Respondents shall ensure that such laboratories shall analyze all samples submitted by EPA pursuant to the Quality Assurance Project Plan ("QAPP") for quality assurance, quality control, and technical activities that will satisfy the stated performance criteria as specified in the QAPP and that sampling and field activities are conducted in accordance with the Agency's "EPA QA Field Activities Procedure" CIO 2105-P-02.1 (9/23/2014), available at https://www.epa.gov/irmpoli8/epa-qa-field-activities-procedures. Respondents shall ensure that the laboratories that are utilized for the analysis of samples taken

pursuant to this Settlement meet the competency requirements set forth in EPA's "Policy to Assure Competency of Laboratories, Field Sampling, and Other Organizations Generating Environmental Measurement Data under Agency-Funded Acquisitions," available at https://www.epa.gov/measurements/documents-about-measurement-competency-under-acquisition-agreements, and that the laboratories perform all analyses using EPA-accepted methods. Accepted EPA methods include methods that are documented in the EPA's Contract Laboratory Program (https://www.epa.gov/superfund/programs/clp/), SW 846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (https://www.epa.gov/hw-sw846), "Standard Methods for the Examination of Water and Wastewater" (http://www.standardmethods.org/), and 40 C.F.R. Part 136, "Air Toxics - Monitoring Methods" (https://www.epa.gov/ttnamti1/airtox.html).

b. Upon approval by EPA, Respondents may use other appropriate analytical methods, as long as (i) quality assurance/quality control ("QA/QC") criteria are contained in the methods and the methods are included in the QAPP, (ii) the analytical methods are at least as stringent as the methods listed above, and (iii) the methods have been approved for use by a nationally recognized organization responsible for verification and publication of analytical methods, e.g., EPA, American Society for Testing and Materials, National Institute for Occupational Safety and Health, Occupational Safety and Health Administration, etc.

c. Respondents shall ensure that all laboratories they use for analysis of samples taken pursuant to this Settlement have a documented quality system that complies with ASQ/ANSI E4:2014 "Quality Management Systems for Environmental Information and Technology Programs – Requirements With Guidance for Use" (American Society for Quality, February 2014), and "EPA Requirements for Quality Management Plans (QA/R-2)" EPA/240/B-01/002 (March 2001, reissued May 2006), or equivalent documentation as determined by EPA. EPA may consider Environmental Response Laboratory Network laboratories, laboratories accredited under the National Environmental Laboratory Accreditation Program, or laboratories that meet International Standardization Organization (ISO 17025) standards or other nationally recognized programs as meeting the quality system requirements.

d. Respondents shall ensure that all field methodologies utilized in collecting samples for subsequent analysis pursuant to this Settlement are conducted in accordance with the procedures set forth in the approved QAPP.

44. **Sampling**

a. Upon request, Respondents shall provide split or duplicate samples to EPA or its authorized representatives. Respondents shall notify EPA not less than seven (7) days in advance of any sample collection activity unless shorter notice is agreed to by EPA. In addition, EPA shall have the right to take any additional samples that EPA deems necessary. Upon request, EPA shall provide to Respondents split or duplicate samples of any samples it takes as part of EPA's oversight of Respondents' implementation of the Work, and any such samples shall be analyzed in accordance with the approved QAPP.

b. Respondents shall submit to EPA, in the next quarterly progress report as described in Paragraph 33 (Progress Reports), the results of all sampling and/or tests or other data (including raw data) obtained or generated by or on behalf of Respondents with respect to the Site and/or the implementation of this Settlement, unless the data has otherwise been submitted to EPA as required by the SOW. Respondents waive any objections to any data gathered, generated, or evaluated by EPA, the Commonwealth, or Respondents in the performance or oversight of the Work that has been validated that meets all quality assurance/quality control ("QA/QC") procedures and objectives required by the Settlement or any EPA-approved RI/FS Work Plans or Sampling and Analysis Plans. If Respondents object to any other data relating to the RI/FS, Respondents shall submit to EPA a report that specifically identifies and explains its objections, describes the acceptable uses of the data, if any, and identifies any limitations to the use of the data. The report must be submitted to EPA within thirty (30) days after the quarterly progress report containing the data.

XI. PROPERTY REQUIREMENTS

45. **Agreements Regarding Access and Non-Interference**. Respondents shall, with respect to any non-settling Owner's Affected Property, use best efforts to secure from such non-settling Owner an agreement, enforceable by Respondents and the United States, providing that such non-settling Owner shall, with respect to such non-settling Owner's Affected Property (i) provide EPA and all Respondents and their representatives, contractors, and subcontractors with access at all reasonable times to such Affected Property to conduct any activity regarding the Settlement, including those listed in Paragraph 45.a (Access Requirements), and (ii) refrain from using such Affected Property in any manner that EPA determines will pose an unacceptable risk to human health or to the environment as a result of exposure to Waste Material, or interfere with or adversely affect the implementation or integrity of the Work. Respondents shall provide a copy of such access agreement(s) to EPA.

a. **Access Requirements**. The following is a list of activities for which access may be required regarding the Affected Property.

b. Monitoring the Work;

c. Verifying any data or information submitted to EPA;

d. Conducting investigations regarding contamination at or near the Site;

e. Obtaining samples;

f. Assessing the need for, planning, implementing, or monitoring response actions;

g. Assessing implementation of quality assurance and quality control practices as defined in the approved QAPP;

h. Implementing the Work pursuant to the conditions set forth in Paragraph 87 (Work Takeover);

i. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Respondents or their agents, consistent with Section XII (Access to Information);

j. Assessing Respondents' compliance with the Settlement;

k. Determining whether the Affected Property is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted under the Settlement; and

l. Implementing, monitoring, maintaining, reporting on, and enforcing any land, water, or other resource use restrictions regarding the Affected Property.

46. **Best Efforts**. As used in this Section, "best efforts" means the efforts that a reasonable person in the position of Respondents would use so as to achieve the goal in a timely manner, including the cost of employing professional assistance and the payment of reasonable sums of money to secure access, as required by this Section. If Respondents are unable to accomplish what is required through "best efforts" in a timely manner, they shall notify EPA and include a description of the steps taken to comply with the requirements. If EPA deems it appropriate, it may assist Respondents, or take independent action, in obtaining such access. All costs incurred by the United States in providing such assistance or taking such action, including the cost of attorney time and the amount of monetary consideration or just compensation paid, constitute Future Response Costs to be reimbursed under Section XVI (Payment of Response Costs).

47. In the event of any Transfer of the Affected Property, unless EPA otherwise consents in writing, Respondents shall continue to comply with their obligations under the Settlement, including their obligation to secure access.

48. Notwithstanding any provision of the Settlement, EPA retains all of its access authorities and rights, as well as all of its rights to require land, water, or other resource use restrictions, including enforcement authorities related thereto under CERCLA, RCRA, and any other applicable statute or regulations.

XII. ACCESS TO INFORMATION

49. Respondents shall provide to EPA, upon request, copies of all records, reports, documents, and other information including records, reports, documents, and other information in electronic form (hereinafter referred to as "Records") within Respondents' possession or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Settlement, including sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information regarding the Work. Respondents shall also make available to EPA, for purposes of investigation or information gathering, their employees, agents, or

representatives who possess knowledge of relevant facts concerning the performance of the Work, subject to any recognized and applicable privilege asserted in accordance with Paragraph 50.

50. **Privileged and Protected Claims**

a. Respondents may assert that all or part of a Record requested by EPA is privileged or protected as provided under federal law, in lieu of providing the Record, provided Respondents comply with Paragraph 50.b, and except as provided in Paragraph 50.c.

b. If Respondents assert a claim of privilege or protection, they shall provide EPA with the following information regarding such Record: its title; its date; the name, title, affiliation (e.g., company or firm), and address of the author, of each addressee, and of each recipient; a description of the Record's contents; and the privilege or protection asserted. If a claim of privilege or protection applies only to a portion of a Record, Respondents shall provide the Record to EPA in redacted form to mask the privileged or protected portion only. Respondents shall retain all Records that they claim to be privileged or protected until EPA has had a reasonable opportunity to dispute the privilege or protection claim and any such dispute has been resolved in Respondents' favor.

c. Respondents may make no claim of privilege or protection regarding (1) any data generated pursuant to the requirements of this Settlement, including all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, radiological, or engineering data, or the portion of any other Record that evidences conditions at or around the Site, or (2) the portion of any Record that Respondents are required to create or generate pursuant to this Settlement.

51. **Business Confidential Claims**. Respondents may assert that all or part of a Record provided to EPA under this Section or Section XIII (Record Retention) is business confidential to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Respondents shall segregate and clearly identify all Records or parts thereof submitted under this Settlement for which Respondents assert business confidentiality claims. Records claimed as confidential business information will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies Records when they are submitted to EPA, or if EPA has notified Respondents that the Records are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such Records without further notice to Respondents.

52. Notwithstanding any provision of this Settlement, EPA retains all of its information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

XIII. RECORD RETENTION

53. Until ten (10) years after EPA provides Respondents with notice, pursuant to Section XXIX (Notice of Completion of Work), that all Work has been fully performed in

accordance with this Settlement, each Respondent shall preserve and retain all non-identical copies of Records (including Records in electronic form) now in its possession or control, or that come into its possession or control, that relate in any manner to its liability under CERCLA with regard to the Site, provided, however, that Respondents who are potentially liable as owners or operators of the Site must retain, in addition, all Records that relate to the liability of any other person under CERCLA with respect to the Site. Each Respondent must also retain, and instruct its contractors and agents to preserve, for the same period of time specified above all non-identical copies of the last draft or final version of any Records now in its possession or control or that come into its possession or control that relate in any manner to the performance of the Work, provided, however, that each Respondent (and its contractors and agents) must retain, in addition, copies of all data generated during the performance of the Work and not contained in the aforementioned Records required to be retained. Each of the above record retention requirements shall apply regardless of any corporate retention policy to the contrary.

54. At the conclusion of the document retention period, Respondents shall notify EPA at least ninety (90) days prior to the destruction of any such Records, and, upon request by EPA, and except as provided in Paragraph 50 (Privileged and Protected Claims), Respondents shall deliver any such Records to EPA.

55. Each Respondent certifies individually that, to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed, or otherwise disposed of any Records (other than identical copies) relating to its potential liability regarding the Site since notification of potential liability by EPA or the Commonwealth and that it has fully complied with any and all EPA and Commonwealth requests for information regarding the Site pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927, and Commonwealth or state law.

XIV. COMPLIANCE WITH OTHER LAWS

56. Nothing in this Settlement limits Respondents' obligation to comply with the requirements of all applicable state and federal laws and regulations when performing the RI/FS. No local, state, or federal permit shall be required for any portion of the Work conducted entirely on-site (i.e., within the areal extent of contamination or in very close proximity to the contamination and necessary for implementation of the Work), including studies, if the action is selected and carried out in compliance with Section 121 of CERCLA, 42 U.S.C. § 9621. Where any portion of the Work that is not on-site requires a federal or state permit or approval, Respondents shall submit timely and complete applications and take all other actions necessary to obtain and to comply with all such permits or approvals. Respondents may seek relief under the provisions of Section XVIII (Force Majeure) for any delay in the performance of the Work resulting from a failure to obtain, or a delay in obtaining, any permit or approval required for the Work, provided that they have submitted timely and complete applications and taken all other actions necessary to obtain all such permits or approvals. This Settlement is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

XV. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

57. **Emergency Response**. If any event occurs during performance of the Work that causes or threatens to cause a release of Waste Material on, at, or from the Site that either constitutes an emergency situation or that may present an immediate threat to public health or welfare or the environment, Respondents shall immediately take all appropriate action to prevent, abate, or minimize such release or threat of release. Respondents shall take these actions in accordance with all applicable provisions of this Settlement, including the Health and Safety Plan. Respondents shall also immediately notify EPA's Project Manager, at 787-977-5844, or, in the event of his/her unavailability, the Chief of the Response and Prevention Branch of the Caribbean Enforcement Protection Division of EPA Region 2 at 787-977-5864, of the incident or Site conditions. In the event that Respondents fail to take appropriate response action as required by this Paragraph, and EPA takes such action instead, Respondents shall reimburse EPA for all costs of such response action not inconsistent with the NCP pursuant to Section XVI (Payment of Response Costs).

58. **Release Reporting**. Upon the occurrence of any event during performance of the Work that Respondents are required to report pursuant to Section 103 of CERCLA, 42 U.S.C. § 9603, or Section 304 of the Emergency Planning and Community Right-to-know Act ("EPCRA"), 42 U.S.C. § 11004, Respondents shall immediately orally notify EPA's Project Manager or, in the event of his/her unavailability, the Chief of the Response and Prevention Branch of the Caribbean Enforcement Protection Division of EPA Region 2 at 787-977-5864, and the National Response Center at (800) 424-8802. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103 of CERCLA, 42 U.S.C. § 9603, and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004.

59. For any event covered under this Section, Respondents shall submit a written report to EPA within seven (7) days after the onset of such event, setting forth the action or event that occurred and the measures taken, and to be taken, to mitigate any release or threat of release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release or threat of release.

XVI. PAYMENT OF RESPONSE COSTS

60. **Post-Closure Trust Fund**. In accordance with the terms of the Trust Agreement, Respondents may request that EPA designate one or more Respondents or other persons as parties to be reimbursed from the Post-Closure Trust Fund established under the Trust Agreement for costs incurred on post-closure expenditures at the Site. By way of example and not limitation, post-closure expenditures may include repairing fencing, conducting maintenance, assessing and repairing certain monitoring wells, repairing the closure cover, designing and installing surface water controls, ditch and sedimentation basin cleaning, and assessing and repairing the leachate collection system. All or some of the costs incurred by Respondents in implementing post-closure activities may be reimbursable, in EPA's sole discretion, using monies from the Post-Closure Trust Fund.

a. In advance of conducting any post-closure activities, Respondents shall submit a Post-Closure Activity Work Plan to be reviewed and approved by EPA in accordance with Section IX (Submission and Approval of Deliverables). The Post-Closure Activity Work Plan shall detail the planned activities, the locations of such activities, and the proposed schedule of activities. Respondents may supplement the Post-Closure Activity Work Plan, if necessary.

b. At any time, Respondents may request an initial nonbinding opinion from EPA on whether certain costs are reimbursable under this Paragraph. EPA shall respond to any such request from Respondents indicating its nonbinding opinion as to whether certain costs are reimbursable under this Paragraph within fourteen (14) days after Respondents' request.

c. Upon the successful completion of any post-closure activities, Respondents shall submit to EPA for review and approval an itemized list of completed post-closure activities and the documented cost of performing each activity. Respondents shall make such submission by March 31 of a given year for all post-closure activities completed during the prior year ending December 31. EPA shall approve or deny Respondents' request for reimbursement under this Paragraph, and shall so notify Respondents in writing. If EPA approves Respondents' request for reimbursement, EPA shall direct the trustee of the Post-Closure Trust Fund to reimburse Respondents under the Trust Agreement.

d. Respondents reserve, and this Settlement is without prejudice to, their ability to seek reimbursement from the Post-Closure Trust Fund. This Settlement does not supersede or in any way modify the terms of the Trust Agreement, including EPA's status as the beneficiary of the Post-Closure Trust Fund, and Respondents' reservation shall not be interpreted to provide for additional rights beyond those set forth in the Trust Agreement.

61. **Payments for Future Response Costs**. Respondents shall pay to EPA all Future Response Costs not inconsistent with the NCP.

a. Respondents shall make payment to EPA by Electronic Funds Transfer ("EFT") through the Pay.gov website using the following link: https://www.pay.gov/public/form/start/11751879. The payment form shall include the following information:

Amount of Payment
Name of Remitter
Docket Number (CERCLA-02-2020-2010)
Site Name (PROTECO)
Site/Spill ID Number (A27M)

b. At the time of payment, Respondents shall send notice that payment has been made to EPA's Project Manager at luna.zolymar@epa.gov, to the Site Attorney at leshak.andrea@epa.gov, and to the EPA Cincinnati Finance Office by email at cinwd_acctsreceivable@epa.gov, or by mail to the following:

EPA Cincinnati Finance Office

26 W. Martin Luther King Drive
Cincinnati, Ohio 45268

Such notice shall reference Site/Spill ID Number A27M and the EPA docket number for this action.

c. **Periodic Bill**. On a periodic basis, EPA will send Respondents a bill requiring payment that includes a Superfund Cost Recovery Package Imaging and On-line System ("SCORPIOS") Report, which includes direct and indirect costs incurred by EPA, its contractors, subcontractors, and the United States Department of Justice. Respondents shall make all payments within forty-five (45) days after Respondents' receipt of each bill requiring payment, except as otherwise provided in Paragraph 63 (Contesting Future Response Costs).

d. **Deposit of Future Response Costs Payments**. The total amount to be paid by Respondents pursuant to Paragraph 61.c (Periodic Bill) shall be deposited by EPA in the PROTECO Site Special Account to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund, provided, however, that EPA may deposit a Future Response Costs payment directly into the EPA Hazardous Substance Superfund if, at the time the payment is received, EPA estimates that the PROTECO Site Special Account balance is sufficient to address currently anticipated future response actions to be conducted or financed by EPA at or in connection with the Site.

62. **Interest**. In the event that any payment for Future Response Costs is not made by the date required, Respondents shall pay Interest on the unpaid balance. The Interest on Future Response Costs shall begin to accrue on the date of the bill. The Interest shall accrue through the date of Respondents' payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondents' failure to make timely payments under this Section, including payment of stipulated penalties pursuant to Section XIX (Stipulated Penalties).

63. **Contesting Future Response Costs**. Respondents may initiate the procedures of Section XVII (Dispute Resolution) regarding payment of any Future Response Costs billed under Paragraph 61 (Payments for Future Response Costs) if they determine that EPA has made a mathematical error or included a cost item that is not within the definition of Future Response Costs, or if they believe EPA incurred excess costs as a direct result of an EPA action that was inconsistent with a specific provision or provisions of the NCP. To initiate such a dispute, Respondents shall submit a Notice of Dispute in writing to EPA's Project Manager within thirty (30) days after receipt of the bill. Any such Notice of Dispute shall specifically identify the contested Future Response Costs and the basis for objection. If Respondents submit a Notice of Dispute, Respondents shall within the 30-day period, also as a requirement for initiating the dispute, (a) pay all uncontested Future Response Costs to EPA in the manner described in Paragraph 61, and (b) establish, in a duly chartered bank or trust company, an interest-bearing escrow account that is insured by the Federal Deposit Insurance Corporation (FDIC) and remit to that escrow account funds equivalent to the amount of the contested Future Response Costs. Respondents shall send to EPA's Project Manager a copy of the transmittal letter and check

paying the uncontested Future Response Costs, and a copy of the correspondence that establishes and funds the escrow account, including, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. If EPA prevails in the dispute, within five (5) days after the resolution of the dispute, Respondents shall pay the sums due (with accrued interest) to EPA in the manner described in Paragraph 61. If Respondents prevail concerning any aspect of the contested costs, Respondents shall pay that portion of the costs (plus associated accrued interest) for which they did not prevail to EPA in the manner described in Paragraph 61. Respondents shall be disbursed any balance of the escrow account. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XVII (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding Respondents' obligation to reimburse EPA for its Future Response Costs.

XVII. DISPUTE RESOLUTION

64. Unless otherwise expressly provided for in this Settlement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement. The Parties shall attempt to resolve any disagreements concerning this Settlement expeditiously and informally.

65. **Informal Dispute Resolution**. If Respondents object to any EPA action taken pursuant to this Settlement, they shall send EPA a written Notice of Dispute describing the objection(s) within fourteen (14) days after such action, except with respect to a dispute related to billings for Future Response Costs, in which case the written Notice of Dispute shall be submitted within thirty (30) days after receipt of the bill in accordance with Paragraph 63. EPA and Respondents shall have fourteen (14) days from EPA's receipt of Respondents' Notice of Dispute to resolve the dispute through informal negotiations (the "Negotiation Period"). The Negotiation Period may be extended at the sole discretion of EPA. Any agreement reached by the Parties pursuant to this Section shall be in writing and shall, upon signature by the Parties, be incorporated into and become an enforceable part of this Settlement.

66. **Formal Dispute Resolution**. If the Parties are unable to reach an agreement within the Negotiation Period, Respondents shall, within thirty (30) days after the end of the Negotiation Period, submit a statement of position to EPA's Project Manager. EPA may, within twenty (20) days thereafter, submit a statement of position. Thereafter, an EPA management official at the Deputy Director level or higher will issue a written decision on the dispute to Respondents. EPA's decision shall be incorporated into and become an enforceable part of this Settlement. Respondents shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with EPA's decision, whichever occurs.

67. Except as provided in Paragraph 63 (Contesting Future Response Costs) or as agreed by EPA, the invocation of formal dispute resolution procedures under this Section does not extend, postpone, or affect in any way any obligation of Respondents under this Settlement. Except as provided in Paragraph 77, stipulated penalties with respect to the disputed matter shall continue to accrue but shall be stayed pending resolution of the dispute. Notwithstanding the stay of payment, stipulated penalties shall accrue from the first day of noncompliance with any

applicable provision of this Settlement. In the event that Respondents do not prevail on the disputed issue, stipulated penalties shall be assessed and paid within fifteen (15) days after resolution of the dispute.

XVIII. FORCE MAJEURE

68. A "Force Majeure" event, for purposes of this Settlement, is defined as any event arising from causes beyond the control of Respondents, of any entity controlled by Respondents, or of Respondents' contractors (possible examples may include hurricanes, earthquakes, and government restrictions or other circumstances as a result of pandemics) that delays or prevents the performance of any obligation under this Settlement despite Respondents' best efforts to fulfill the obligation. The requirement that Respondents exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event (a) as it is occurring and (b) following the potential force majeure event such that the delay and any adverse effects of the delay are minimized to the greatest extent possible. A "Force Majeure" event does not include financial inability to complete the Work or increased cost of performance.

69. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement, whether or not caused by a Force Majeure event, Respondents shall notify EPA's Project Manager orally or, in his or her absence, the alternate EPA Project Manager, or, in the event both of EPA's designated representatives are unavailable, the Director of the Waste Management Division, EPA Region 2, within five (5) days of when Respondents first knew that the event might cause a delay. Within ten (10) days thereafter, Respondents shall provide in writing to EPA an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondents' rationale for attributing such delay to a force majeure event; and a statement as to whether, in the opinion of Respondents, such event may cause or contribute to an endangerment to public health or welfare or the environment. Respondents shall include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure event. Respondents shall be deemed to know of any circumstance of which Respondents, any entity controlled by Respondents, or Respondents' contractors knew or should have known. Failure to comply with the above requirements regarding an event shall preclude Respondents from asserting any claim of a force majeure event regarding that event, provided, however, that if EPA, despite the late or incomplete notice, is able to assess to its satisfaction whether the event is a force majeure event under Paragraph 68 and whether Respondents have exercised their best efforts under Paragraph 68, EPA may, in its unreviewable discretion, excuse in writing Respondents' failure to submit timely or complete notices under this Paragraph.

70. If EPA agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Settlement that are affected by the force majeure event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If EPA

does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, EPA will notify Respondents in writing of its decision. If EPA agrees that the delay is attributable to a force majeure event, EPA will notify Respondents in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

71. If Respondents elect to invoke the dispute resolution procedures set forth in Section XVII (Dispute Resolution), they shall do so no later than fifteen (15) days after receipt of EPA's notice. In any such proceeding, Respondents shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Respondents complied with the requirements of Paragraphs 68 and 69. If Respondents carry this burden, the delay at issue shall be deemed not to be a violation by Respondents of the affected obligation of this Settlement identified to EPA.

72. The failure by EPA to timely complete any obligation under the Settlement is not a violation of the Settlement, provided, however, that if such failure prevents Respondents from meeting one or more deadlines under the Settlement, Respondents may seek relief under this Section.

XIX. STIPULATED PENALTIES

73. Respondents shall be liable to EPA for stipulated penalties in the amounts set forth in Paragraphs 74.a and 75 for failure to comply with the obligations specified in Paragraphs 74.b and 75, unless excused under Section XVIII (Force Majeure). "Comply" as used in the previous sentence includes compliance by Respondents with all applicable requirements of this Settlement, within the deadlines established under this Settlement.

74. **Stipulated Penalty Amounts: Payments, Financial Assurance, Major Deliverables, and Other Milestones**

a. The following stipulated penalties shall accrue per violation per day for any noncompliance with any obligation identified in Paragraph 74.b:

Penalty Per Violation Per Day	**Period of Noncompliance**
$ 1,000	1st through 14th day
$ 2,000	15th through 30th day
$ 4,000	31st day and beyond

b. **Obligations**

(1) Payment of any amount due under Section XVI (Payment of Response Costs).

(2) Establishment and maintenance of financial assurance in accordance with Section XXVII (Financial Assurance).

(3) Establishment of an escrow account to hold any disputed Future Response Costs under Paragraph 63 (Contesting Future Response Costs).

(4) Submission of the draft RI/FS Work Plan, draft Sampling and Analysis Plan, draft RI Report, Treatability Testing Work Plan, Treatability Testing Sampling and Analysis Plan, Treatability Testing Health and Safety Plan, and draft FS Report as required under this Settlement.

(5) Submission of modifications requested by EPA to the RI/FS Work Plan, Sampling and Analysis Plan, draft RI Report, Treatability Testing Work Plan, Treatability Testing Sampling and Analysis Plan, Treatability Testing Health and Safety Plan, and draft FS Report as required under this Settlement.

75. **Stipulated Penalty Amounts: Other Deliverables.** The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate deliverables required by this Settlement, other than those specified in Paragraph 74.b:

Penalty Per Violation Per Day	**Period of Noncompliance**
$ 500	1st through 14th day
$ 1,000	15th through 30th day
$ 2,500	31st day and beyond

76. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 87 (Work Takeover), Respondents shall be liable for a stipulated penalty in the amount of $200,000. Stipulated penalties under this Paragraph are in addition to the remedies available to EPA under Paragraphs 87 (Work Takeover) and 112 (Access to Financial Assurance).

77. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. Penalties shall continue to accrue during any dispute resolution period, and they shall be paid within fifteen (15) days after the agreement or the receipt of EPA's decision. However, stipulated penalties shall not accrue: (a) with respect to a deficient submission under Section IX (Submission and Approval of Deliverables), during the period, if any, beginning on the day of EPA's receipt of such submission until the date that EPA notifies Respondents in writing of any deficiency; and (b) with respect to a decision by the EPA Management Official at the Deputy Director level or higher, under Paragraph 66 (Formal Dispute Resolution), during the period, if any, beginning after the day the Negotiation Period begins until the date that the EPA Management Official issues a final decision regarding such dispute. Nothing in this Settlement shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement.

78. Following EPA's determination that Respondents have failed to comply with a requirement of this Settlement, EPA will provide Respondents with written notification of the failure and describe the noncompliance. EPA may send Respondents a written demand for the

payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of when EPA notifies Respondents of a violation.

79. All penalties accruing under this Section shall be due and payable to EPA within thirty (30) days after Respondents' receipt from EPA of a demand for payment of the penalties, unless Respondents invoke the Dispute Resolution procedures under Section XVII (Dispute Resolution) within the 30-day period. All payments to EPA under this Section shall indicate that the payment is for stipulated penalties and shall be made in accordance with Paragraph 61 (Payments for Future Response Costs).

80. If Respondents fail to pay stipulated penalties when due, Respondents shall pay Interest on the unpaid stipulated penalties as follows: (a) if Respondents have timely invoked dispute resolution such that the obligation to pay stipulated penalties has been stayed pending the outcome of dispute resolution, Interest shall accrue from the date stipulated penalties are due pursuant to Paragraph 77 until the date of payment; and (b) if Respondents fail to timely invoke dispute resolution, Interest shall accrue from the date of demand under Paragraph 79 until the date of payment. If Respondents fail to pay stipulated penalties and Interest when due, the United States may institute proceedings to collect the penalties and Interest.

81. The payment of penalties and Interest, if any, shall not alter in any way Respondents' obligation to complete performance of the Work required under this Settlement.

82. Nothing in this Settlement shall be construed as prohibiting, altering, or in any way limiting the ability of EPA to seek any other remedies or sanctions available by virtue of Respondents' violation of this Settlement or of the statutes and regulations upon which it is based, including penalties pursuant to Section 122(*l*) of CERCLA, 42 U.S.C. § 9622(*l*), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3), provided, however, that EPA shall not seek civil penalties pursuant Section 122(*l*) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided in this Settlement, except in the case of willful violation of this Settlement or in the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 87 (Work Takeover).

83. Notwithstanding any other provision of this Section, EPA may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Settlement.

XX. COVENANTS BY EPA

84. In consideration of the obligations set forth in this Settlement, except as provided in Section XXI (Reservations of Rights by EPA), EPA covenants not to sue or to take administrative action against Respondents pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for the Work and Future Response Costs. These covenants shall take effect upon the Effective Date. These covenants are conditioned upon the complete and satisfactory performance by Respondents of their obligations under this Settlement. These

covenants extend only to Respondents and their successors and do not extend to any other person.

XXI. RESERVATIONS OF RIGHTS BY EPA

85. Except as specifically provided in this Settlement, nothing in this Settlement shall limit the power and authority of EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants, or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing in this Settlement shall prevent EPA from seeking legal or equitable relief to enforce the terms of this Settlement, from taking other legal or equitable action as it deems appropriate and necessary, or from requiring Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable law.

86. The covenant not to sue set forth in Section XX (Covenants by EPA) above does not pertain to any matters other than those expressly identified therein. EPA reserves, and this Settlement is without prejudice to, all rights against Respondents with respect to all other matters, including:

a. liability for failure by Respondents to meet a requirement of this Settlement;

b. liability for costs not included within the definition of Future Response Costs;

c. liability for performance of response action other than the Work;

d. criminal liability;

e. liability for violations of federal, Commonwealth, or state law that occur during or after implementation of the Work;

f. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

g. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site; and

h. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry related to the Site not paid as Future Response Costs under this Settlement.

87. **Work Takeover**

a. In the event EPA determines that Respondents: (1) have ceased implementation of any portion of the Work; (2) are seriously or repeatedly deficient or late in

their performance of the Work; or (3) are implementing the Work in a manner that may cause an endangerment to human health or the environment, EPA may issue a written notice ("Work Takeover Notice") to Respondents. Any Work Takeover Notice issued by EPA (which writing may be electronic) will specify the grounds upon which such notice was issued and will provide Respondents a period of thirty (30) days within which to remedy the circumstances giving rise to EPA's issuance of such notice.

b. If, after expiration of the thirty-day notice period specified in Paragraph 87.a, Respondents have not remedied to EPA's satisfaction the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, EPA may at any time thereafter assume the performance of all or any portion(s) of the Work as EPA deems necessary ("Work Takeover"). EPA will notify Respondents in writing (which writing may be electronic) if EPA determines that implementation of a Work Takeover is warranted under this Paragraph 87.b. Funding of Work Takeover costs is addressed under Paragraph 112 (Access to Financial Assurance).

c. Respondents may invoke the procedures set forth in Section XVII (Dispute Resolution) to dispute EPA's implementation of a Work Takeover under Paragraph 87.b. However, notwithstanding Respondents' invocation of such dispute resolution procedures, and during the pendency of any such dispute, EPA may in its sole discretion commence and continue a Work Takeover under Paragraph 87.b until the earlier of (1) the date that Respondents remedy, to EPA's satisfaction, the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, or (2) the date that a written decision terminating such Work Takeover is rendered in accordance with Paragraph 66 (Formal Dispute Resolution).

d. Notwithstanding any other provision of this Settlement, EPA retains all authority and reserves all rights to take any and all response actions authorized by law.

XXII. COVENANTS BY RESPONDENTS

88. Subject to Paragraph 94, Respondents covenant not to sue and agree not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, Future Response Costs, or this Settlement, including:

a. any direct or indirect claim for reimbursement from the EPA Hazardous Substance Superfund through Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claims under Sections 107 and 113 of CERCLA, Section 7002(a) of RCRA, 42 U.S.C. § 6972(a), or Commonwealth or state law regarding the Work, Future Response Costs, and this Settlement; or

c. any claim arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Commonwealth of Puerto Rico Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, or at common law.

89. Except as provided in Paragraph 92 (Waiver of Claims by Respondents) these covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to the reservations set forth in Section XXI (Reservations of Rights by EPA), other than in Paragraph 86.a (liability for failure to meet a requirement of the Settlement), 86.d (criminal liability), or 86.e (liability for violations of federal or state law), but only to the extent that Respondents' claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

90. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

91. Respondents reserve, and this Settlement is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of the United States Code, and brought pursuant to any statute other than CERCLA or RCRA and for which the waiver of sovereign immunity is found in a statute other than CERCLA or RCRA, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States, as that term is defined in 28 U.S.C. § 2671, while acting within the scope of his or her office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, the foregoing shall not include any claim based on EPA's selection of response actions, or the oversight or approval of Respondents' deliverables or activities.

92. **Waiver of Claims by Respondents**

a. Respondents agree to waive all claims or causes of action and not to assert any claims (including claims or causes of action under Sections 107(a) and 113 of CERCLA) that they may have as follows:

(1) **De Micromis Waiver**. For all matters relating to the Site against any person where the person's liability to Respondents with respect to the Site is based solely on having arranged for disposal or treatment, or for transport for disposal or treatment, of hazardous substances at the Site, or having accepted for transport for disposal or treatment of hazardous substances at the Site, if all or part of the disposal, treatment, or transport occurred before April 1, 2001, and the total amount of material containing hazardous substances contributed by such person to the Site was less than 110 gallons of liquid materials or 200 pounds of solid materials;

(2) **MSW Waiver**. For all matters relating to the Site against any person where the person's liability to Respondents with respect to the Site is based solely on having arranged for disposal or treatment, or for transport for disposal or treatment, of municipal solid waste ("MSW") at the Site, if the volume of MSW disposed, treated, or transported by such person to the Site did not exceed 0.2 percent of the total volume of waste at the Site; and

(3) ***De Minimis*/Ability to Pay Waiver**. For response costs relating to the Site against any person that has entered or in the future enters into a final Section 122(g) *de minimis* settlement, 42 U.S.C. § 9622(g), or a final settlement based on limited ability to pay, with EPA with respect to the Site.

b. **Exceptions to Waivers**

(1) The waivers under this Paragraph 92 shall not apply with respect to any defense, claim, or cause of action that a Respondent may have against any person otherwise covered by such waivers if such person asserts a claim or cause of action relating to the Site against such Respondent.

(2) The waiver under Paragraph 92.a(1) (De Micromis Waiver) shall not apply to any claim or cause of action against any person otherwise covered by such waiver if EPA determines that: (i) the materials containing hazardous substances sent to the Site by such person contributed significantly or could contribute significantly, either individually or in the aggregate, to the cost of the response action or natural resource restoration at the Site; or (ii) such person has failed to comply with any information request or administrative subpoena issued pursuant to Section 104(e) or 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) or 9622(e), or Section 3007 of RCRA, 42 U.S.C. § 6927, or has impeded or is impeding, through action or inaction, the performance of a response action or natural resource restoration with respect to the Site; or if (iii) such person has been convicted of a criminal violation for the conduct to which the waiver would apply and that conviction has not been vitiated on appeal or otherwise.

93. The waiver under Paragraph 92.a(2) (MSW Waiver) shall not apply to any claim or cause of action against any person otherwise covered by such waiver if EPA determines that: (i) the materials containing hazardous substances contributed to the Site by such person contributed significantly or could contribute significantly, either individually or in the aggregate, to the cost of the response action or natural resource restoration at the Site; or (ii) such person has failed to comply with any information request or administrative subpoena issued pursuant to Section 104(e) or 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) or 9622(e), or Section 3007 of RCRA, 42 U.S.C. § 6927, or has impeded or is impeding, through action or inaction, the performance of a response action or natural resource restoration with respect to the Site.

94. Respondents reserve, and this Settlement is without prejudice to, claims that Respondents have or may have against the United States brought pursuant to Section 113(f) of CERCLA, 42 U.S.C. § 9613(f), relating to the Work or Future Response Costs.

XXIII. OTHER CLAIMS

95. By issuance of this Settlement, the United States and EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondents. The United States or EPA shall not be deemed a party to any contract entered into by

Respondents or their directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Settlement.

96. Except as expressly provided in Paragraph 92 (Waiver of Claims by Respondents) and Section XX (Covenants by EPA), nothing in this Settlement constitutes a satisfaction of or release from any claim or cause of action against Respondents or any person not a party to this Settlement for any liability such person may have under CERCLA, other statutes, or common law, including any claims of the United States for costs, damages, and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

97. No action or decision by EPA pursuant to this Settlement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXIV. EFFECT OF SETTLEMENT/CONTRIBUTION

98. Except as provided in Paragraph 92 (Waiver of Claims by Respondents), nothing in this Settlement shall be construed to create any rights in, or grant any cause of action to, any person not a Party to this Settlement. Except as provided in Section XXII (Covenants by Respondents), each of the Parties expressly reserves any and all rights (including pursuant to Section 113 of CERCLA, 42 U.S.C. § 9613), defenses, claims, demands, and causes of action which each Party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a Party hereto. Nothing in this Settlement diminishes the right of the United States, pursuant to Section 113(f)(2) and (3) of CERCLA, 42 U.S.C. § 9613(f)(2)-(3), to pursue any such persons to obtain additional response costs or response action and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2).

99. The Parties agree that this Settlement constitutes an administrative settlement pursuant to which each Respondent has, as of the Effective Date, resolved liability to the United States within the meaning of Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), and is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, or as may be otherwise provided by law, for the "matters addressed" in this Settlement. The "matters addressed" in this Settlement are the Work and Future Response Costs.

100. The Parties further agree that this Settlement constitutes an administrative settlement pursuant to which each Respondent has, as of the Effective Date, resolved liability to the United States within the meaning of Section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B).

101. Each Respondent shall, with respect to any suit or claim brought by it for matters related to this Settlement, notify EPA in writing no later than sixty (60) days prior to the initiation of such suit or claim. Each Respondent also shall, with respect to any suit or claim brought against it for matters related to this Settlement, notify EPA in writing within ten (10) days after service of the complaint or claim upon it. In addition, each Respondent shall notify EPA within ten (10) days after service or receipt of any motion for summary judgment and

within ten (10) days after receipt of any order from a court setting a case for trial, for matters related to this Settlement.

102. In any subsequent administrative or judicial proceeding initiated by EPA, or by the United States on behalf of EPA, for injunctive relief, recovery of response costs, or other relief relating to the Site, Respondents shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenant by EPA set forth in Section XX (Covenants By EPA).

XXV. INDEMNIFICATION

103. The United States does not assume any liability by entering into this Settlement or by virtue of any designation of Respondents as EPA's authorized representatives under Section 104(e) of CERCLA, 42 U.S.C. § 9604(e), and 40 C.F.R. § 300.400(d)(3). Respondents shall indemnify, save, and hold harmless the United States, its officials, agents, employees, contractors, subcontractors, and representatives for or from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, or subcontractors, and any persons acting on Respondents' behalf or under their control, in carrying out activities pursuant to this Settlement. Further, Respondents agree to pay the United States all costs it incurs, including attorneys' fees and other expenses of litigation and settlement arising from, or on account of, claims made against the United States based on negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors, and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement. The United States shall not be held out as a party to any contract entered into by or on behalf of Respondents in carrying out activities pursuant to this Settlement. Neither Respondents nor any such contractor shall be considered an agent of the United States.

104. The United States shall give Respondents notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondents prior to settling such claim.

105. Respondents covenant not to sue and agree not to assert any claims or causes of action against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work on or relating to the Site, including claims on account of construction delays. In addition, Respondents shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work on or relating to the Site, including claims on account of construction delays.

XXVI. INSURANCE

106. No later than thirty (30) days before commencing any on-site Work, Respondents shall secure, and shall maintain until the first anniversary after issuance of Notice of Completion of Work pursuant to Section XXIX (Notice of Completion of Work), commercial general liability insurance with limits of liability of $1 million per occurrence, automobile liability insurance with limits of liability of $1 million per accident, and umbrella liability insurance with limits of liability of $5 million in excess of the required commercial general liability and automobile liability limits, naming EPA as an additional insured with respect to all liability arising out of the activities performed by or on behalf of Respondents pursuant to this Settlement. In addition, for the duration of the Settlement, Respondents shall provide EPA with certificates of such insurance. Upon request from EPA, Respondents shall provide EPA with a copy of each insurance policy. In addition, for the duration of the Settlement, Respondents shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing Work on behalf of Respondents in furtherance of this Settlement. If Respondents demonstrate by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in a lesser amount, then, with respect to the contractor or subcontractor, Respondents need provide only that portion of the insurance described above that is not maintained by the contractor or subcontractor. Respondents shall ensure that all submittals to EPA under this Paragraph identify the Site, Peñuelas, Puerto Rico and the EPA docket number for this action.

XXVII. FINANCIAL ASSURANCE

107. In order to ensure completion of the Work, Respondents shall secure financial assurance, initially in the amount of $4,500,000.00 ("Estimated Cost of the Work"), for the benefit of EPA. The financial assurance must be one or more of the mechanisms listed below, in a form substantially identical to the relevant sample documents available from EPA or under the "Financial Assurance - Settlements" category on the Cleanup Enforcement Model Language and Sample Documents Database at https://cfpub.epa.gov/compliance/models/, and satisfactory to EPA. Respondents may use multiple mechanisms if they are limited to surety bonds guaranteeing payment, letters of credit, trust funds, and/or insurance policies.

a. A surety bond guaranteeing payment and/or performance of the Work that is issued by a surety company among those listed as acceptable sureties on federal bonds as set forth in Circular 570 of the U.S. Department of the Treasury;

b. An irrevocable letter of credit, payable to or at the direction of EPA, that is issued by an entity that has the authority to issue letters of credit and whose letter-of-credit operations are regulated and examined by a federal or state agency;

c. A trust fund established for the benefit of EPA that is administered by a trustee that has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency;

d. A policy of insurance that provides EPA with acceptable rights as a beneficiary thereof and that is issued by an insurance carrier that has the authority to issue insurance policies in the applicable jurisdiction(s) and whose insurance operations are regulated and examined by a federal or state agency;

e. A demonstration by a Respondent that it meets the financial test criteria of Paragraph 109; or

f. A guarantee to fund or perform the Work executed in favor of EPA by a company: (1) that is a direct or indirect parent company of a Respondent or has a "substantial business relationship" (as defined in 40 C.F.R. § 264.141(h)) with a Respondent; and (2) can demonstrate to EPA's satisfaction that it meets the financial test criteria of Paragraph 109.

108. Respondents shall, within thirty (30) days of the Effective Date, submit to EPA for approval the form of Respondents' initial financial assurance. Within thirty (30) days of such approval, Respondents shall secure all executed and/or otherwise finalized mechanisms or other documents consistent with the EPA-approved form of financial assurance and shall submit such mechanisms and documents to Chief, Resource Management/Cost Recovery Section, Superfund and Emergency Management Division, U.S. EPA Region 2, 290 Broadway, 18th Floor, New York, NY 10007-1866. Respondents shall send copies by email to Chief, Resource Management/Cost Recovery Section, currently at Keating.Robert@epa.gov, and additional copies by email to EPA's Project Manager and Site Attorney, currently at: Luna.Zolymar@epa.gov; and Leshak.Andrea@epa.gov.

109. Respondents seeking to provide financial assurance by means of a demonstration or guarantee under Paragraph 107.e or 107.f, must, within thirty (30) days of the Effective Date:

a. Demonstrate that:

(1) the affected Respondent or guarantor has:

i. Two of the following three ratios: a ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and a ratio of current assets to current liabilities greater than 1.5; and

ii. Net working capital and tangible net worth each at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; and

iii. Tangible net worth of at least $10 million; and

iv. Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; or

(2) The affected Respondent or guarantor has:

i. A current rating for its senior unsecured debt of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A or Baa as issued by Moody's; and

ii. Tangible net worth at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; and

iii. Tangible net worth of at least $10 million; and

iv. Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the Estimated Cost of the Work and the amounts, if any, of other federal, state, or tribal environmental obligations financially assured through the use of a financial test or guarantee; and

b. Submit to EPA for the affected Respondent or guarantor: (1) a copy of an independent certified public accountant's report of the entity's financial statements for the latest completed fiscal year, which must not express an adverse opinion or disclaimer of opinion; and (2) a letter from its chief financial officer and a report from an independent certified public accountant substantially identical to the sample letter and reports available from EPA or under the "Financial Assurance-Settlements" subject list category on the Cleanup Enforcement Model Language and Sample Documents Database at https://cfpub.epa.gov/compliance/models/.

110. Respondents providing financial assurance by means of a demonstration or guarantee under Paragraph 107.e or 107.f must also:

a. Annually resubmit the documents described in Paragraph 109.b within ninety (90) days after the close of the affected Respondent's or guarantor's fiscal year;

b. Notify EPA within thirty (30) days after the affected Respondent or guarantor determines that it no longer satisfies the relevant financial test criteria and requirements set forth in this Section; and

c. Provide to EPA, within thirty (30) days of EPA's request, reports of the financial condition of the affected Respondent or guarantor in addition to those specified in Paragraph 109.b; EPA may make such a request at any time based on a belief that the affected Respondent or guarantor may no longer meet the financial test requirements of this Section.

111. Respondents shall diligently monitor the adequacy of the financial assurance. If any Respondent becomes aware of any information indicating that the financial assurance provided under this Section is inadequate or otherwise no longer satisfies the requirements of this Section, such Respondent shall notify EPA of such information within seven (7) days. If EPA determines that the financial assurance provided under this Section is inadequate or otherwise no longer satisfies the requirements of this Section, EPA will notify the affected Respondent of such determination. Respondents shall, within thirty (30) days after notifying EPA or receiving notice from EPA under this Paragraph, secure and submit to EPA for approval a proposal for a revised or alternative financial assurance mechanism that satisfies the requirements of this Section. EPA may extend this deadline for such time as is reasonably necessary for the affected Respondent, in the exercise of due diligence, to secure and submit to EPA a proposal for a revised or alternative financial assurance mechanism, not to exceed sixty (60) days. Respondents shall follow the procedures of Paragraph 113 (Modification of Amount, Form, or Terms of Financial Assurance) in seeking approval of, and submitting documentation for, the revised or alternative financial assurance mechanism. Respondents' inability to secure financial assurance in accordance with this Section does not excuse performance of any other obligation under this Settlement.

112. **Access to Financial Assurance**

a. If EPA issues a notice of implementation of a Work Takeover under Paragraph 87.b, then, in accordance with any applicable financial assurance mechanism, EPA is entitled to the following: (1) the performance of the Work; and/or (2) require that any funds guaranteed be paid in accordance with Paragraph 112.d.

b. If EPA is notified by the issuer of a financial assurance mechanism that it intends to cancel the mechanism, and the affected Respondent fails to provide an alternative financial assurance mechanism in accordance with this Section at least thirty (30) days prior to the cancellation date, the funds guaranteed under such mechanism must be paid prior to cancellation in accordance with Paragraph 112.d.

c. If, upon issuance of a notice of implementation of a Work Takeover under Paragraph 87.b, either: (1) EPA is unable for any reason to promptly secure the resources guaranteed under any applicable financial assurance mechanism, whether in cash or in kind, to continue and complete the Work; or (2) the financial assurance is a demonstration or guarantee under Paragraphs 107.e or 107.f, then EPA is entitled to demand an amount, as determined by EPA, sufficient to cover the cost of the remaining Work to be performed. Respondents shall, within thirty (30) days of such demand, pay the amount demanded as directed by EPA.

d. Any amounts required to be paid under this Paragraph 112 shall be, as directed by EPA: (i) paid to EPA in order to facilitate the completion of the Work by EPA or by another person; or (ii) deposited into an interest-bearing account, established at a duly chartered

bank or trust company that is insured by the FDIC, in order to facilitate the completion of the Work by another person. If payment is made to EPA, EPA may deposit the payment into the EPA Hazardous Substance Superfund or into the PROTECO Site Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by EPA to the EPA Hazardous Substance Superfund.

e. All EPA Work Takeover costs not paid under this Paragraph 112 must be reimbursed as Future Response Costs under Section XVI (Payment of Response Costs).

113. **Modification of Amount, Form, or Terms of Financial Assurance**. Respondents may submit, on any anniversary of the Effective Date or at any other time agreed to by the Parties, a request to reduce the amount, or change the form or terms, of the financial assurance mechanism. Any such request must be submitted to EPA in accordance with Paragraph 108, and must include an estimate of the cost of the remaining Work, an explanation of the bases for the cost calculation, and a description of the proposed changes, if any, to the form or terms of the financial assurance. EPA will notify Respondents of its decision to approve or disapprove a requested reduction or change pursuant to this Paragraph. Respondents may reduce the amount of the financial assurance mechanism only in accordance with: (a) EPA's approval; or (b) if there is a dispute, the agreement or written decision resolving such dispute under Section XVII (Dispute Resolution). Respondents may change the form or terms of the financial assurance mechanism only in accordance with EPA's approval. Any decision made by EPA on a request submitted under this Paragraph to change the form or terms of a financial assurance mechanism shall not be subject to challenge by Respondents pursuant to the dispute resolution provisions of this Settlement or in any other forum. Within thirty (30) days after receipt of EPA's approval of, or the agreement or decision resolving a dispute relating to, the requested modifications pursuant to this Paragraph, Respondents shall submit to EPA documentation of the reduced, revised, or alternative financial assurance mechanism in accordance with Paragraph 108.

114. **Release, Cancellation, or Discontinuation of Financial Assurance**. Respondents may release, cancel, or discontinue any financial assurance provided under this Section only: (a) if EPA issues a Notice of Completion of Work under Section XXIX (Notice of Completion of Work); (b) in accordance with EPA's approval of such release, cancellation, or discontinuation; (c) if there is a dispute regarding the release, cancellation or discontinuance of any financial assurance, in accordance with the agreement or final decision resolving such dispute under Section XVII (Dispute Resolution); or (d) thirty days after the issuance of the Record of Decision.

XXVIII. MODIFICATION

115. EPA's Project Manager may modify any plan or schedule or the SOW in writing or by oral direction, consistent with the NCP and this Settlement. Any such oral modification will be memorialized in writing by EPA promptly, but shall have as its effective date the date of EPA's Project Manager's oral direction. Any other requirements of this Settlement may be modified in writing by mutual agreement of the parties.

116. If Respondents seek permission to deviate from any approved work plan or schedule or the SOW, Respondents' Project Coordinator shall submit a written request to EPA for approval outlining the proposed modification and its basis. Respondents may not proceed with the requested deviation until receiving oral or written approval from EPA's Project Manager pursuant to Paragraph 115.

117. No informal advice, guidance, suggestion, or comment by EPA's Project Manager or other EPA representatives regarding any deliverable submitted by Respondents shall relieve Respondents of their obligation to obtain any formal approval required by this Settlement, or to comply with all requirements of this Settlement, unless it is formally modified.

XXIX. NOTICE OF COMPLETION OF WORK

118. When EPA determines that all Work has been fully performed in accordance with this Settlement, with the exception of any continuing obligations required by this Settlement, including payment of Future Response Costs and Record Retention, EPA will provide written notice to Respondents. If EPA determines that any Work has not been completed in accordance with this Settlement, EPA will notify Respondents, provide a list of the deficiencies, and require that Respondents modify the RI/FS Work Plan, if appropriate, in order to correct such deficiencies, in accordance with Paragraph 30 (Modification of the RI/FS Work Plan). Respondents shall implement the modified and approved RI/FS Work Plan and shall submit a modified draft RI Report and/or FS Report in accordance with the EPA notice. Failure by Respondents to implement the approved modified RI/FS Work Plan shall be a violation of this Settlement.

XXX. INTEGRATION/APPENDICES

119. This Settlement and its appendices constitute the final, complete, and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement. The parties acknowledge that there are no representations, agreements, or understandings relating to the settlement other than those expressly contained in this Settlement. The following appendices are attached to and incorporated into this Settlement:

a. "Appendix A" is the complete list of Respondents.

b. "Appendix B" is the description and/or map of the Site.

c. "Appendix C" is the SOW.

XXXI. ADMINISTRATIVE RECORD

120. EPA will determine the contents of the administrative record file for selection of the remedial action. Respondents shall submit to EPA documents developed during the course of the RI/FS upon which selection of the remedial action may be based. Upon request of EPA, Respondents shall provide EPA with copies of plans, task memoranda for further action, quality assurance memoranda and audits, raw data, field notes, laboratory analytical reports, and other

reports in their possession. Upon request of EPA, Respondents shall additionally submit all communications between Respondents and Commonwealth, state, local, or other federal authorities concerning selection of the remedial action. Respondents shall only be responsible for providing to EPA any previous studies conducted under Commonwealth, state, local, or other federal authorities that may relate to selection of the remedial action to the extent that they possess them.

XXXII. EFFECTIVE DATE

121. This Settlement shall be effective five (5) days after the Settlement is signed by or on behalf of the Director of the Superfund and Emergency Management Division of EPA Region 2 and a fully executed copy is transmitted to Respondents' designated counsel, to be designated by Respondents.

122. This Settlement may be amended. The Parties acknowledge that within fifteen (15) days after the Effective Date of this Settlement the Parties anticipate the possibility of adding the following additional Parties who have yet to consent to become Respondents: Abbott Health Products, Inc.; Abbott Laboratories; Olay, LLC; and The Procter & Gamble Company. The Parties further acknowledge and agree that any such amendment to this Settlement within the fifteen (15) day period that solely adds additional Parties as additional Respondents shall require only the signature of (i) such additional Respondent(s); (ii) a duly designated representative of Respondents; and (iii) EPA. This Settlement may be otherwise amended under other circumstances by mutual agreement of EPA and Respondents. All amendments shall be in writing and shall be effective when signed by EPA. EPA Project Managers do not have the authority to sign amendments to the Settlement.

IT IS SO AGREED AND ORDERED:

U.S. ENVIRONMENTAL PROTECTION AGENCY:

Evangelista, Pat

Digitally signed by Evangelista, Pat
Date: 2020.09.30 20:22:44 -04'00'

_____
Dated

_____
Pat Evangelista, Director
Superfund and Emergency Management Division, Region 2

Signature Page for Settlement Regarding PROTECO Superfund Site

FOR: BASF Agrochemical Products, B.V.

Dated: 9/30/20

Ricardo Morales
General Manager
BASF Agrochemical Products B.V., Puerto Rico Branch d/b/a BASF Agricultural Products de Puerto Rico
State Road #2
P.O. Box 243
Manati, PR 00674

FOR Block Drug Company, Inc.:

SEP. 30, 2020
Dated

Justin T. Huang
Vice President & Secretary
5 Crescent Drive, NY0300, Philadelphia, PA 19112

FOR Checkpoint Caribbean Ltd.:

9/28/2020
Dated

Mark A. McClendon
Vice President & General Counsel
Checkpoint Caribbean Ltd.
17700 Foltz Parkway
Strongsville, OH. 44149

Signature Page for Settlement Regarding PROTECO Superfund Site

FOR: EMD Millipore Corporation

September 28, 2020

Christos Ross
President and CEO
EMD Millipore Corporation
400 Summit Drive
Burlington, MA 01803

FOR General Electric Company, for itself and on behalf of Caribe GE International of Puerto Rico, Inc., GE Industrial of PR LLC, and GEA Caribbean Export LLC:

9/30/20
Dated

Andrew J. Thomas
Associate General Counsel
GE Global Operations
c/o Angelica Todd
1 River Road
Bldg. 5, 7th Floor West
Schenectady, NY 12345-6000

Signature Page for Settlement Regarding PROTECO Superfund Site

FOR: Henkel Puerto Rico, Inc.

9/30/2020
Dated

[Name] Deborah Vennos
[Title] Assistant General Counsel
[Company] Henkel Corporation
[Address] 1 Henkel Way; Rocky Hill, CT 06067

9/30/2020
Dated

[Name] Robert McNamee
[Title] Vice President
[Company] Henkel Corporation
[Address] 1 Henkel Way; Rocky Hill, CT 06067

Signature Page for Settlement Regarding PROTECO Superfund Site

FOR HP INC. :
HP Inc.

9/30/2020
Dated

Christopher Dirscherl
Interim Head of Americas EHS and Remediation
HP Inc.
1501 Page Mill Road, M/S 1400
Palo Alto, CA 94304

FOR PUERTO RICO ELECTRIC POWER AUTHORITY
[Print name of Respondent]

Sept - 30 - 2020
Dated

[Name] Efran Paredes Maisonet
[Title] Interim Executive Director
[Company] Puerto Rico Electric Power Authority
[Address] PO Box 364267
San Juan, Puerto Rico 00936-4267

Signature Page for Settlement Regarding PROTECO Superfund Site

FOR: Roche Products Inc.

Sep 29, 2020
Dated

Edna Jiménez
President and General Manager
Roche Products Inc.

C/O Julia Miller
Genentech, Inc., A Member of the Roche Group
Legal Department
1 DNA Way (MS-49)
South San Francisco, CA 94080

APPENDIX A

List of Respondents

BASF Agrochemical Products, B.V.

Block Drug Company, Inc.

Checkpoint Caribbean Ltd.

EMD Millipore Corporation

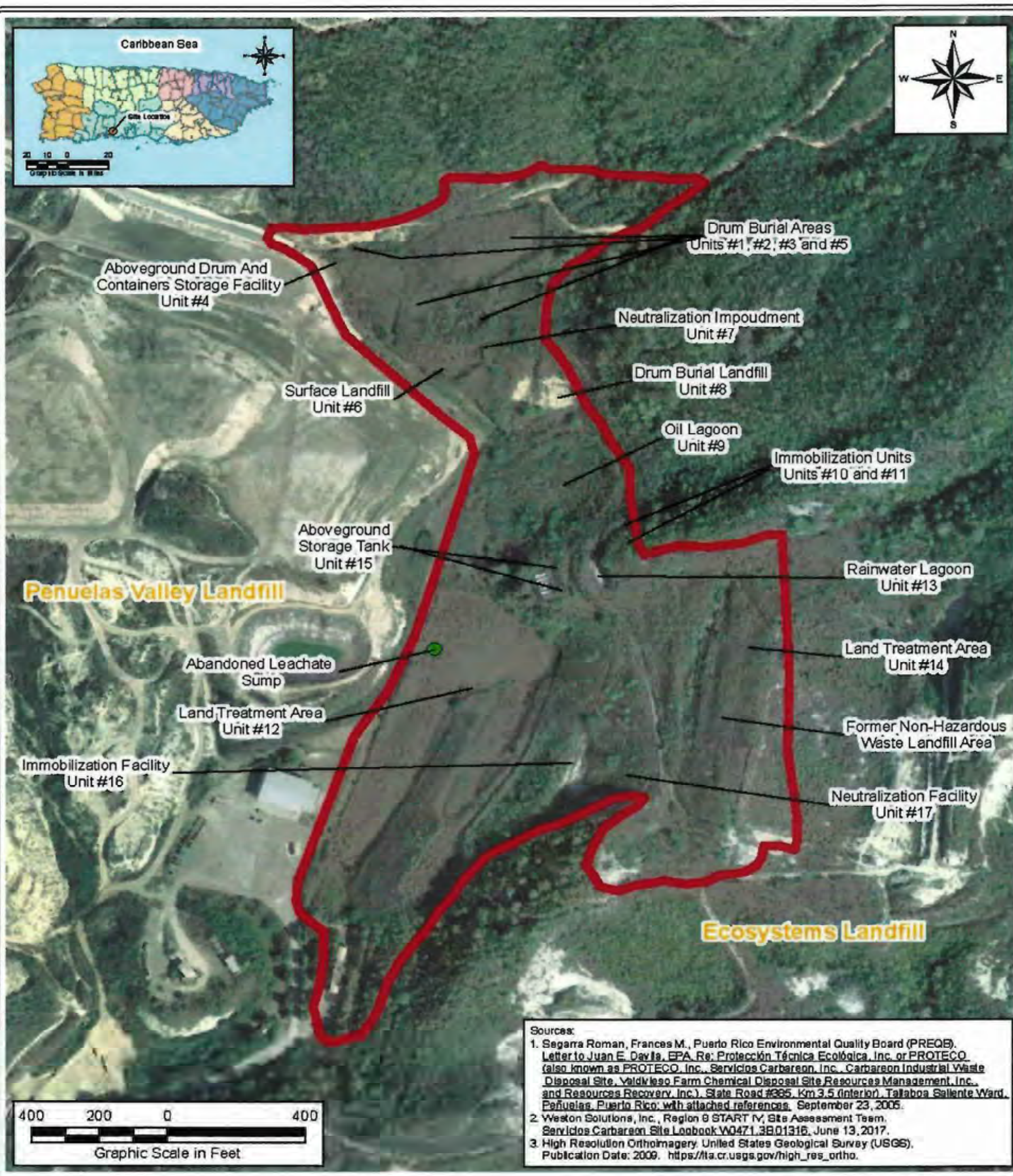
General Electric Company (for itself and on behalf of Caribe GE International of Puerto Rico, Inc., GE Industrial of PR LLC, and GEA Caribbean Export LLC)

Henkel Puerto Rico, Inc.

HP Inc.

Puerto Rico Electric Power Authority

Roche Products, Inc.



Sources:

1. Segarra Roman, Frances M., Puerto Rico Environmental Quality Board (PREQB). Letter to Juan E. Davila, EPA. Re: Protección Técnica Ecológica, Inc. or PROTECO (also known as PROTECO, Inc., Servicios Carbareon, Inc., Carbareon Industrial Waste Disposal Site, Valdivieso Farm Chemical Disposal Site Resources Management, Inc., and Resources Recovery, Inc.), State Road #385, Km 3.5 (interior), Tallaboa Saliente Ward, Peñuelas, Puerto Rico; with attached references. September 23, 2005.
2. Weston Solutions, Inc., Region 9 START IV, Site Assessment Team. Servicios Carbareon Site Logbook W0471.3B01316. June 13, 2017.
3. High Resolution Orthoimagery. United States Geological Survey (USGS). Publication Date: 2009. https://lta.cr.usgs.gov/high_res_ortho.

LEGEND:	TITLE:
● Site Reference Point ▭ Approximate Facility Boundary	Site Map PROTECO Peñuelas, Puerto Rico
PROJECT: 0004/1707-02	

CLIENT NAME:		DATE:	FIGURE:
EPA	WESTON	October 2017	2

APPENDIX C
STATEMENT OF WORK FOR
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
PROTECCIÓN TÉCNICA ECOLÓGICA (PROTECO) SUPERFUND SITE
Tallaboa Ward, Peñuelas, Puerto Rico

I. INTRODUCTION

A. The purpose of this Remedial Investigation/Feasibility study ("RI/FS") is to investigate the nature and extent of contamination at the PROTECO Site and develop and evaluate potential remedial alternatives as provided in this Statement of Work ("SOW"). The RI and FS are interactive and may be conducted concurrently so that the data collected in the RI influences the development of remedial alternatives in the FS, which in turn affects the data needs and the scope of treatability studies.

B. This SOW has been developed for the PROTECO Site, which operated as a Treatment, Storage and Disposal ("TSD") facility of hazardous waste from 1975 through 1999. From 1997 to 1999, PROTECO closed several Solid Waste Management Units ("SWMUs"); some of these were closed with hazardous and non-hazardous waste in-place and others were excavated and disposed of on-site in a Corrective Action Management Unit ("CAMU"). Limited post-closure care maintenance, excluding groundwater monitoring, was conducted at the facility until approximately 2001. Analytical results for groundwater monitoring wells at the Site from sampling events conducted in 1984, 1988 and 1994, indicate the presence of elevated concentrations of mercury and VOCs, including: 1,1-dichloroethane (1,1-DCA); 1,2-dichloroethane (1,2-DCA); 1,1–dichloroethylene (1,1-DCE); trans-1,2-dichloroethylene (trans-1,2-DCE); tetrachloroethylene (PCE); 1,1,1-trichloroethane (1,1,1-TCA); trichloroethylene (TCE). Sampling of on-site monitoring wells and hydrogeological studies indicate that VOC contamination has migrated to the aquifer beneath the Site. Recent EPA site visits indicate that the Site has been abandoned, security fencing has been compromised, and warning signs are not visible. In addition, overgrown vegetation and cattle feeding operations have been observed at the Site.

C. Respondents shall conduct the RI/FS and shall produce RI and FS reports that are in accordance with this SOW, the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (U.S. EPA, OSWER Directive # 9355.3-01, October 1988 or subsequently issued guidance), and any other guidance that EPA uses in conducting a RI/FS, as well as any additional requirements in the Administrative Settlement Agreement and Order on Consent ("Settlement Agreement"). The RI/FS Guidance describes the report format and the required report content. Respondents shall furnish all necessary personnel, materials, and services needed for, or incidental to, the performance of the RI/FS, except as otherwise specified in the Settlement Agreement.

D. The RI/FS shall be conducted in a manner that minimizes environmental impacts in accordance with EPA Region 2 Clean and Green Policy (available at https://www.epa.gov/greenercleanups/epa-region-2-clean-and-green-policy) to the extent consistent with the National Contingency Plan (NCP), 40 C.F.R. Part 300. Respondents

shall follow Guidance on Systematic Planning using the Data Quality Objectives Process (QA/G-4) EPA/240/B-06/001 February 2006, in planning and conducting the RI/FS.

E. At the completion of the RI/FS, EPA will be responsible for the selection of the remedy for the Site and will document the remedy selection in a Record of Decision ("ROD"). The remedial action alternative selected by EPA will meet the cleanup standards specified in CERCLA Section 121, 42 U.S.C. § 9621. That is, the selected remedial action will be protective of human health and the environment, will be in compliance with, or include a waiver of, applicable or relevant and appropriate requirements of other laws ("ARARs"), will be cost-effective, will utilize permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable, and will address the statutory preference for treatment as a principal element. The final RI/FS report, as adopted by EPA, and the baseline risk assessment will, with the administrative record, form the basis for the selection of the remedy for the Site and will provide the information necessary to support the development of the ROD.

F. As specified in CERCLA Section 104(a)(1), 42 U.S.C. § 9604(a)(1), EPA will provide oversight of Respondents' activities throughout the RI/FS. Respondents shall support EPA's initiation and conduct of activities related to the implementation of oversight activities.

G. If there is a conflict between this SOW and the Settlement Agreement, the provisions of the Settlement Agreement govern.

H. The specific RI/FS activities to be conducted at the PROTECO Site are segregated into thirteen (13) separate tasks, described in the following sections:

II. Task 1 – RI/FS Scoping and Planning
III. Task 2 – RI/FS Work Plan
IV. Task 3 – Community Relations
V. Task 4 – Site Characterization
VI. Task 5 – RI/FS Work Plan Addendum
VII. Task 6 – Implementation of RI/FS Work Plan Addendum
VIII. Task 7 – Identification of Candidate Technologies
IX. Task 8 – Treatability Studies
X. Task 9 – Baseline Risk Assessment
XI. Task 10 – Remedial Investigation Report
XII. Task 11 – Feasibility Study: Development and Screening of Remedial Alternatives
XIII. Task 12 – Monthly Progress Report
XIV. Task 13 – Feasibility Study Report

I. The Respondents shall follow the attached schedule, SOW Deliverables (Attachment I), throughout the submission of the RI/FS. Deviations and time extensions from the SOW Deliverables schedule shall be requested in writing, at least fourteen (14) days prior to the

scheduled deadline. EPA will not approve time extensions exceeding a one hundred fifty (150) day period, unless Respondents can factually demonstrate that deliverables are not attainable for reasons beyond their control or Force Majeure provisions as set forth in Section XVIII (Force Majeure) of the Settlement Agreement, apply.

II. TASK 1 –RI/FS SCOPING AND PLANNING

A. Within sixty (60) days of the effective date of the Settlement Agreement, the Respondents shall conduct a site reconnaissance. In addition, Respondents shall prepare and submit to EPA for approval, a RI/FS Scoping and Planning Technical Memorandum ("SPTM') within sixty (60) days of completion of the site reconnaissance. The SPTM shall include, at a minimum, the following information.

1. Site Location, Project Base Mapping and Database (e.g., topographic maps, aerial photographs, data collected as part of the NPL listing process)

   A Site location map(s) identifying water features, stormwater and/or runoff patterns, SWMUs, CAMU, buildings, utilities, paved areas, easements, rights-of-way, and other features on the site and within 2 miles of the Site boundary, as well as runoff patterns within a 3-mile radius of the Site. In addition, include a topographic survey of the site conducted by a Puerto Rico licensed land surveyor to determine horizontal distances of appropriate physical features and elevations. Develop a geographic information system layer or dataset, including but not limited to property ownership, results of geomorphology survey, wetlands, water features, locations of monitoring wells, irrigation wells, drinking water wells, sampling locations, and any other significant activities. The intent is not to perform a property boundary survey, but to confirm boundaries so that subsequent remedial investigations and/or remedial measures will not carry over on to neighboring properties without appropriate authorization.

2. Preliminary Conceptual Site Model

   A summary of the actual and potential onsite and offsite health and environmental effects posed by the existing contamination at the Site. Emphasis should be on providing a preliminary understanding of the sources of contamination, potential release mechanisms, potential routes of migration, and potential human and environmental receptors.

3. History of Regulatory and Response Actions

   A summary of any previous response actions conducted by local, State, Federal, or private parties. Site reference documents and their locations should be identified.

4. Preliminary Site Boundary and Site Security

A preliminary Site boundary to define the initial area(s) of the remedial investigation. This preliminary boundary may also be used to define an area of access control, identify site security measures such as physical barriers and warning signs, and to restrict access to livestock, trespassers and/or squatters.

5. Evaluate Existing Data

   All existing Site data shall be thoroughly compiled and reviewed. Specifically, this shall include presently available data relating to the type and quantities of hazardous substances and closed SWMUs at the Site. This shall also include results from any previous sampling events that may have been conducted. This information shall be utilized in determining additional data needed to characterize the Site and to better define potential ARARs.

6. The Proposed Scope of the Project

   Identify contaminants of potential concern ("COPCs")[1] and the specific investigative and analytical activities that shall be required, including but not limited to the potential locations of the monitoring wells.

7. Preliminary Remedial Action Objectives

   Identify preliminary remedial action objectives as well as a preliminary list of general response actions and associated technologies. The range of potential general response actions should encompass, where appropriate, those in which treatment significantly reduces the toxicity, mobility, or volume of the waste; those that involve containment with little or no treatment; and a no-action alternative.

8. Potential ARARs

   Provide a summary of the potential ARARs associated with the location and contaminants of the Site and the potential response actions being contemplated.

B. Technical Meeting-1 – RI/FS Work Plan and Site Characterization Summary Report Pre-Submittal: Respondents shall meet with EPA thirty (30) days after submitting the SPTM, to discuss preliminary findings, potential technical concerns, and/or the identification of best management practices to be used at the Site.

III. TASK 2 - RI/FS WORK PLAN

[1] Preliminary COPCs must be based on the Hazard Ranking System Evaluation report ("HRS Report") prepared by EPA for the PROTECO site and/or EPA approved records. Once new data is collected, selection of COPCs should be updated pursuant to Task 9, Section X of SOW.

A. Within ninety (90) days after Respondents receive written notification of EPA's approval of the SPTM, Respondents shall prepare and submit for EPA's review and approval a RI/FS Work Plan for conducting field investigations at the Site. The Work Plan shall also include and take into consideration the information that was compiled and the outcomes of the evaluations that were conducted as part of the site reconnaissance and SPTM. EPA will approve the RI/FS Work Plan or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

B. The Work Plan shall include a comprehensive description of the work to be performed, including the methodologies to be utilized, Data Quality Objectives ("DQOs"), as well as a corresponding schedule for completion. Specifically, the Work Plan shall present an evaluation of Site characteristics, a statement of the problem(s) and potential problem(s) posed by the Site and plans to achieve the following objectives of the RI/FS: (1) define the sources of contamination and the condition of the existing solid waste management units; and (2) describe the nature and extent of contamination arising from Site releases.

C. The Work Plan shall include a Field Sampling Plan ("FSP"), a Quality Assurance Project Plan ("QAPP"), and a Health and Safety Plan ("HSP"), although each plan may be delivered under separate cover.

D. In addition, the RI/FS Work Plan shall at least include the following:

    1. *Standard Operating Procedures* – to evaluate the integrity of the final covers that were installed over the SWMUs located at the Site. These procedures shall identify measures to prevent field investigation activities (i.e., Site clearing, soil borings, monitoring well installation) from causing additional releases of hazardous substances.

    2. *Hydrologic and Hydraulic Study* – to be used to develop a stormwater management program and identify potential pathways-receptors.

    3. *Hydrogeologic Investigation* – to fulfill data gaps, if any, and update the Site's hydrogeologic description.

    4. *Groundwater Characterization* – strategy to address the impacts related to the releases of hazardous substances to groundwater and the installation of shallow and deep groundwater monitoring wells (MWs) at water bearing zones, upgradient and downgradient from the SWMUs and CAMU. Refer to HRS Report Reference 29, Hazardous Waste Ground-Water Task Force, Evaluation of Proteccion Técnica Ecológica report, for information related to the previous locations of MWs. The COPCs shall be identified in the SPTM when designing the program.

5. *Groundwater Monitoring* – to detect whether groundwater migrating offsite contain COPCs at levels that pose unacceptable risk (using human health and ecological risk assessment processes).

6. *Interim Measures* – to address imminent threats to human health and the environment that may be identified during the course of the RI/FS.

E. The Respondents shall refer to Appendix B of the RI/FS Guidance for a comprehensive description of the contents of the required work plan. The need for additional data and analyses may be identified throughout the RI/FS process. The Respondents shall submit a technical memorandum documenting the need for additional data and identifying the DQOs whenever such requirements are identified. The Respondents are responsible for providing additional data and analysis needs identified by EPA consistent with the general scope and the objectives of the RI/FS. It is the intention of EPA and Respondents that additional activities shall be designed and conducted, to the extent technically feasible, in a manner that will prevent and/or minimize releases of hazardous substances from the Site and from the corrective measures implemented as part of the RCRA closure conducted pursuant to an EPA-approved closure plan.

F. In addition, the Work Plan must include the rationale for performing the required activities, including but not limited to the process for identifying Federal and state ARARs (chemical-specific, location-specific, and action-specific).

G. The Work Plan should be developed in conjunction with the FSP, the QAPP, and the HSP.

H. All sampling and analyses performed pursuant to the Settlement Agreement shall conform to EPA policy and guidance regarding sampling, quality assurance, quality control, data validation, and chain of custody procedures. Respondents shall incorporate these procedures into the QAPP in accordance with the Uniform Federal Policy for Implementing Quality Systems ("UFP-QS").

I. The QAPP shall demonstrate that each laboratory used is qualified to conduct the proposed work. This includes the use of methods and analytical protocols for the chemicals of concern in the media of interest within detection and quantification limits consistent with both QA/QC procedures and DQOs approved in the QAPP.

J. The QAPP shall be prepared consistent with the UFP-QAPP, Parts 1, 2 and 3, EPA-505-B-04-900A, B and C, March 2005, "Uniform Federal Policy for Quality Assurance Project Plans – Optimized UFP-QAPP Worksheets," Part 2A, Revision 1, (March 2012), and other guidance documents referenced in the aforementioned guidance documents and in accordance with Section X (Quality, Assurance, Sampling, and Data Analysis) of the Settlement Agreement.

K. The QAPP and FSP shall provide for collection of data sufficient to meet the objectives of the RI/FS and shall specifically include the following items:

1. An explanation of the way(s) the sampling, analysis, testing, and monitoring will produce data for the RI/FS;

2. A detailed description of the sampling, analysis, and testing to be performed, including sampling methods, analytical and testing methods, sampling locations and frequency of sampling to be implemented to sample and analyze the contaminants found in soil, groundwater, surface water, and sediment as necessary;

3. A description of how sampling data and a Site base map will be submitted in a manner that is consistent with the Region 2 Electronic Data Deliverable ("EDD") format. Region 2's "Comprehensive Electronic Data Deliverable Specification Manual 5.0" (February 2018) explains the systematic implementation of EDD within EPA Region 2 and provides detailed instructions of data preparation and identification of data fields required for data submissions. Additional Region 2 EDD guidance and requirements documents, including the "Electronic Data Deliverables Valid Values Reference Manual" and tables, the "Basic Manual for Historic Electronic Data," the "Standalone EQuIS Data Processor User Guide," and EDD templates, can be found at https://www.epa.gov/superfund/region-2-superfund-electronic-data-submission. Other delivery methods may be allowed if electronic direct submission presents a significant burden or as technology changes; and

4. A map depicting sampling locations (to the extent that these can be defined when the QAPP and FSP are prepared).

L. In order to provide quality assurance and maintain quality control with respect to all samples to be collected, Respondents shall ensure the following:

1. Quality assurance and chain of custody procedures shall be performed in accordance with standard EPA protocol and guidance identified in this SOW, and the guidance provided in the EPA Region 2 Quality Assurance Homepage (https://www.epa.gov/quality/region-2-quality-assurance-guidance-and-standard-operating-procedures), and the guidelines set forth in the Settlement Agreement.

2. Once laboratories have been chosen, each laboratory's quality assurance plan ("LQAP") shall be submitted for review by EPA. In addition, the laboratory or Respondents on behalf of the laboratory shall submit to EPA current copies (within the past twelve (12) months) of laboratory certification provided from

either a state or federal agency which conducts certification. The certification shall be applicable to the matrices and analyses that are to be conducted. If the laboratory does not participate in the Contract Laboratory Program ("CLP"), it must submit to EPA the results of performance evaluation ("PE") samples for the constituents of concern from within the past twelve (12) months or it must complete PEs for the matrices and analyses to be conducted and the results must be submitted with the LQAP.

3. The laboratories utilized for analyses of samples must perform all analyses according to approved EPA methods or, if requested by Respondents and approved by EPA, an alternate method.

4. Unless indicated otherwise in the approved QAPP, upon receipt from the laboratory, all data used quantitatively in the risk assessment shall be validated.

5. The validation package (checklist, report and Form I's containing the final data) submitted to EPA shall be prepared in accordance with the provisions of subparagraph 6 below as part of the RI Report submittal.

6. Respondents shall assure that all analytical data that are validated as required by the QAPP are validated according to the latest version of EPA Region 2 data validation Standard Operating Procedures. Region 2 Standard Operating Procedures are available at: http://www.epa.gov/region02/qa/documents.htm.

7. Unless indicated otherwise in the QAPP, Respondents shall require deliverables equivalent to CLP data packages from the laboratory for analytical data. Upon EPA's request, Respondents shall submit to EPA the full documentation (including raw data) for this analytical data. EPA reserves the right to perform an independent data validation, data validation check, or qualification check on generated data.

8. Respondents shall insert a provision in their contract(s) with the laboratory utilized for analyses of samples that requires granting access to EPA personnel and authorized representatives of the EPA for the purpose of ensuring the accuracy of laboratory results related to the Site.

M. The Work Plan shall also include the following:

1. Data Management Procedures

a. *Document Field Activities*. Information gathered during characterization of the Site shall be consistently documented and adequately recorded by Respondents in field logs and laboratory reports. Field logs or dedicated field log-books must be utilized to document observations, measurements, and

significant events that have occurred during field activities. Laboratory reports must document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies.

b. *Maintain Sample Management and Tracking*. Respondents shall maintain field reports, sample shipment records, analytical results, and QA/QC reports to ensure that only validated analytical data are reported and utilized in the risk assessment and evaluation of remedial alternatives. Analytical results developed under the Work Plan must be accompanied by, or cross-referenced to, a corresponding QA/QC report. In addition, Respondents shall safeguard chain of custody forms and other project records to prevent loss, damage, or alteration of project documentation.

N. The HSP shall conform to 29 CFR § 1910.120, "OSHA Hazardous Waste Operations Standards," and the EPA guidance document, "Standard Operating Safety Guidelines" (OSWER, 1988). EPA does not approve HSPs.

Respondents shall conduct a Stage 1A Cultural Resources Survey ("CRS") to address the requirements of the National Historic Preservation Act (see CERCLA Compliance with Other Laws Manual: Part II: Clean Air Act and Other Environmental Statutes and State Requirements, OSWER Directive 9234.1-02, August 1989. Should EPA determine after a review of the recommendations contained in the Stage 1A CRS that additional cultural resource investigations (Stage 1B CRS, Stage 2 CRS, etc.) will be necessary, Respondents shall submit a detailed CRS Work Plan for EPA approval prior to commencing the additional investigations.

IV. TASK 3 - COMMUNITY RELATIONS

To the extent requested by EPA, Respondents shall provide information relating to the work required hereunder for EPA's use in developing and implementing a Community Involvement Plan. As requested by EPA, Respondents shall participate in the preparation of appropriate information disseminated to the public and participate in public meetings which may be held or sponsored by EPA.

V. TASK 4 - SITE CHARACTERIZATION

A. Respondents shall initiate the activities described herein and submit a Site Characterization Summary Report ("SCSR") for EPA's approval. The overall objective of Site characterization is to describe areas of the Site that may pose a threat to human health or the environment. This shall be accomplished by determining the Site's physiography, geology, and hydrology. Potential surface and subsurface pathways of migration and locations of sources of contamination shall be defined. Respondents shall identify the sources of contamination and characterize the nature, extent, and volume of the sources of contamination, including their physical and chemical

constituents as well as their concentrations at incremental locations relative to background concentrations in the affected media. Potential contaminant degradation processes shall be evaluated. Using this information, contaminant fate and transport shall be estimated. The data shall be discussed and shall be summarized in graphical and tabular form. Relevant physical information and information regarding the fate and transport of chemical constituents shall be summarized.

B. The Respondents shall review the investigative activities that have taken place and describe and display Site data documenting the location and characteristics of surface and subsurface features and contamination at the Site including the affected medium, location, types, physical state, concentration of contaminants and quantity. In addition, the location, dimensions, physical condition and varying concentrations of each contaminant throughout each source and the extent of contaminant migration through each of the affected media shall be documented. The Site characterization summary shall provide EPA with a preliminary reference for developing the risk assessment and evaluating the development and screening of remedial alternatives and the refinement and identification of ARARs.

C. When performing this Task, Respondents shall include the following units and media, unless otherwise required:

    1. CAMU, defined as hazardous waste disposal unit, which was designed and constructed to contain the hazardous waste and contaminated media that was generated as part of the remediation activities that were conducted as part of PROTECO's closure activities.

    2. SWMUs, including non-hazardous and hazardous waste units that were closed with waste in-place.

    3. Groundwater, defined as all groundwater contamination at the Site and any other areas where hazardous substances have migrated.

    4. Soil, defined as all surface and subsurface soils that have been impacted by the releases of hazardous substances.

    5. Water features - Sediment, defined as all surface water and sediment that have been impacted by the releases of hazardous substances.

D. Respondents shall conduct field investigations to define the Site's physical characteristics, sources of contamination, and the nature and extent of contamination at the Site. These activities shall be performed by the Respondents in accordance with the RI/FS Work Plan. At a minimum, the following shall be conducted and included in the SCSR:

1. Implement and Document Field Support Activities

i. *Site Characteristics*. Respondents shall review existing data and collect additional data on the physical and biological characteristics of the Site and its surrounding areas including the physiography, geology, and hydrology, and specific physical characteristics identified during the RI/FS Scoping and Planning. This information shall be ascertained through a combination of physical measurements, observations, and sampling efforts and shall be utilized to define potential transport pathways and human and ecological receptor populations. In defining the Site's physical characteristics, the Respondents shall also obtain sufficient engineering data (such as pumping characteristics) for the projection of contaminant fate and transport, and development and screening of remedial action alternatives, including information to assess treatment technologies.

ii. *Define Sources of Contamination.* Respondents shall locate each source of contamination in each media. For each source of contamination located at the Site, the areal extent and depth of contamination shall be determined by sampling at incremental depths on a sampling grid or other appropriate sampling locations or by other sampling means, as defined in the RI/FS Work Plan. The physical characteristics and chemical constituents and their concentrations shall be determined for all such known and discovered sources of contamination. Respondents shall conduct sufficient sampling to define the boundaries of such contaminant sources to the level established in the QAPP and DQOs. Defining the source(s) of contamination shall include analyzing the potential for contaminant release, contaminant mobility and persistence, and characteristics important for evaluating remedial actions, including information to assess treatment technologies.

iii. *Describe the Nature and Extent of Contamination.* During the field investigations, Respondents shall gather information to describe the nature and extent of contamination at the Site. To describe the nature and extent of contamination, Respondents shall utilize the information on the Site's physical and biological characteristics and sources of contamination to give a preliminary estimate of the contaminants that may have migrated, to what extent they have migrated, and their potential to migrate further. Respondents shall then implement a monitoring program and any other study program identified in RI/FS Work Plan (which includes the QAPP) such that by using analytical techniques to detect and quantify the concentration of contaminants in all media, the amount of contaminant degradation occurring and the migration of contaminants through the various media at the Site can be determined. In addition, Respondents shall gather data for calculations of contaminant fate and transport. This process shall continue until the area and depth of contamination are known to the

level of contamination established in the QAPP and DQOs. The information on the nature, extent and migration potential of contamination shall be used to determine the level of risk. Respondents shall use this information to help to determine aspects of the appropriate remedial action alternatives to be evaluated.

2. Data Analyses

   i. *Evaluate Site Characteristics*. Respondents shall analyze and evaluate the data to: (1) describe Site physical and biological characteristics, (2) describe contaminant source characteristics, (3) determine the nature and extent of contamination, (4) determine the contaminant fate and transport; and as necessary develop Site-specific human health and ecological risk assessments. Results of the Site's physical characteristics, source characteristics, and extent and mobility of contamination analyses shall be utilized in the analysis of contaminant fate and transport. The evaluation shall include the actual and potential magnitude of releases from the sources, and horizontal and vertical spread of contamination as well as mobility and persistence of contaminants. Where modeling is appropriate, such models shall be identified to EPA in a technical memorandum prior to their use. All data and programming, including any proprietary programs, shall be made available to EPA together with a sensitivity analysis. Models proposed to be used shall be subject to EPA's approval. Analysis of data collected for characterization of the Site shall meet the DQOs developed in the QAPP.

3. Data Management Procedures

   i. *Document Field Activities*. Information gathered during Site characterization shall be consistently documented and adequately recorded by the Respondents in well maintained field logs and laboratory reports. The method(s) of documentation must be specified in the EPA Approved RI/FS Work Plan and QAPP. Field logs must be utilized to document observations, measurements, and significant events that have occurred during field activities. Laboratory reports must document sample custody, analytical responsibility, analytical results, adherence to prescribed protocols, nonconformity events, corrective measures, and/or data deficiencies.

   ii. *Maintain Sample Management and Tracking*. Respondents shall maintain field reports, sample shipment records, analytical results, and QA/QC reports to ensure that only validated analytical data are reported and utilized in the development and evaluation of remedial alternatives. Analytical results developed under the Work Plan shall not be included in any Site

characterization reports unless accompanied by or cross-referenced to a corresponding QA/QC report. In addition, the Respondents shall establish a data security system to safeguard chain-of custody forms and other project records to prevent loss, damage, or alteration of project documentation.

E. The Respondents shall notify EPA at least seven (7) days prior to initiating field work, regarding the planned dates for field activities, including but not limited to field lay out of the sampling grid, excavation, installation of wells, initiating sampling, installation and calibration of equipment, pump tests, ecological field surveys and other field investigation activities. Within seven (7) days after completion of each phase of field activities, Respondent shall so advise EPA in writing or via electronic mail message.

F. Respondents shall provide EPA with validated and unvalidated analytical data within ninety (90) days after each sampling activity. Additionally, if requested by EPA, Respondents shall make all data available to EPA upon receipt from the lab. All data submitted to EPA shall be compiled in a database format or spreadsheet acceptable to EPA and shall show the location, medium and results for each sample.

G. Within thirty (30) days after Respondents' completion of sampling, analysis, and data evaluation to update the preliminary conceptual site model presented in the RI/FS Work Plan, Respondents shall notify EPA and report any concerns and/or issues that may require immediate attention. Preliminary and validated results shall be included in the subsequent Progress Report pursuant to Section VIII (Work to be Performed) of the Settlement Agreement.

VI. TASK 5 – RI/FS WORK PLAN ADDENDUM

A. If determined necessary by EPA, Respondents shall submit a detailed RI/FS Work Plan Addendum for the completion of the RI/FS within ninety (90) days of receipt of EPA's written request. The EPA's comments on the SCSR, if any, shall be used for planning the RI/FS Work Plan Addendum. The RI/FS Work Plan Addendum shall include, among other things, a detailed description and schedule for RI Addendum and the FS.

B. The Phase 2 RI/FS Work Plan shall supplement existing data and propose appropriate investigations to satisfy the identified data gaps in current understanding of the sources of contamination, nature and extent of the contamination, and Site characteristics as they relate to the Site, in accordance with the following general requirements: (1) Define Sources of Contamination, (2) Describe the Nature and Extent of Contamination, and (3) Evaluate Site Characteristics.

C. If determined necessary by EPA, thirty (30) days following submittal of the RI/FS Work Plan Addendum, Respondents shall submit a Technical Memorandum (Groundwater Modeling/Fate and Transport Modeling Approach) to EPA. This Technical Memorandum (TM) shall describe the proposed methodology and data needs

to perform analytical and/or numerical groundwater modeling at the Site. The numerical model will be calibrated to existing conditions. Where modeling is appropriate, objectives of the TM will include summarizing data collected to date and proposed modeling software, model design, input data, calibration objectives, and sensitivity analysis. Models proposed to be used shall be subject to EPA's approval. EPA will approve the TM or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

D. In the event that additional sampling locations, testing, and analyses are required or other alterations of the QAPP are required, Respondents shall submit to EPA a memorandum documenting the need for additional data to the EPA Remedial Project Manager within seventy-five (75) days of identification. EPA in its discretion will determine whether the additional data will be collected by the Respondents and whether it will be incorporated into plans, reports, and other deliverables.

E. At EPA's request, Respondents shall perform a Reuse Assessment. If EPA determines that a Reuse Assessment is required and so notifies Respondents, Respondents shall, within forty-five (45) days thereafter, submit a Reuse Assessment Report. The Reuse Assessment Report should provide adequate information to develop realistic assumptions of the reasonably anticipated future uses for the Site. Respondents shall prepare the Reuse Assessment Report in accordance with EPA guidance including but not limited to, "Reuse Assessment: A Tool to Implement the Superfund Land Use Directive," OSWER Directive 9355.7-06P, June 4, 2001, or subsequently issued guidance. EPA will approve the Reuse Assessment Report or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

VII. TASK 6 – IMPLEMENTATION OF THE RI/FS WORK PLAN ADDENDUM

A. Within sixty (60) days of EPA's written approval, Respondents shall initiate the provisions of the RI/FS Work Plan Addendum.

B. Within ninety (90) days of EPA's approval of the Draft-TM (Section VI. C), Respondents shall submit a Final TM, which will present the findings and conclusions from groundwater modeling (numerical and/or analytical, if utilized) and fate and transport modeling (if utilized) to EPA for review. Technical Meeting-2 may be scheduled, if needed, to further discuss findings and conclusions. EPA will approve the Final TM or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

VIII. TASK 7 - IDENTIFICATION OF CANDIDATE TECHNOLOGIES

A. A Technical Memorandum Identifying Candidate Technologies (TMCT) shall be submitted by Respondents within sixty (60) days after Respondents' submission to

EPA of the last set of final validated analytical data, and prior to identification and screening of remedial alternatives under Paragraph XII.A.3 below. Upon EPA's receipt of the TMCT, Technical Meeting-3 will be scheduled to discuss findings. The candidate technologies identified shall include innovative treatment technologies (as defined in the RI/FS Guidance) where appropriate. The listing of candidate technologies shall cover the range of technologies required for alternatives analysis. Respondents shall conduct a literature survey to gather information on performance, relative costs, applicability, removal efficiencies, operation and maintenance (O&M) requirements, and implementability of candidate technologies.

B. EPA will approve the TMCT within thirty (30) days or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement. If EPA determines that practical candidate technologies have not been sufficiently demonstrated or cannot be adequately evaluated for this Site on the basis of available information, EPA may require that treatability testing be conducted as described in Section IX (Task 8: Treatability Studies; as necessary).

IX. TASK 8 - TREATABILITY STUDIES

A. If determined to be necessary by EPA, Respondents shall perform treatability testing to assist in the detailed analysis of alternatives. Once a decision has been made to perform treatability studies, the following activities shall be performed by Respondents.

1. Evaluate Treatability Studies

EPA, with input from Respondents, will decide on the type of treatability testing to use (e.g., bench versus pilot). The decision to perform pilot testing should be made as early in the process as possible to minimize potential delays of the FS.

2. Treatability Testing Work Plan

Within ninety (90) days after EPA's written determination that treatability testing is necessary and the decision on the type of treatability testing to be used is made, Respondents shall submit a Treatability Testing Work Plan and schedule. The Treatability Testing Work Plan shall describe the background of the Site, remedial technology(ies) to be tested, test objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety, and residual waste management. The DQOs for treatability testing should be documented as well. If modifications to the existing FSP are necessary to perform the treatability testing, the modifications will be outlined in the Plan or in an Attachment. If pilot scale treatability testing is to be performed, the Work Plan shall include a description of pilot test installation and start-up, pilot test operation and maintenance procedures, operating conditions to be tested, and sampling plan to determine pilot test performance. If testing is to be

performed off-Site, Respondents shall address all necessary permitting requirements to the satisfaction of appropriate authorities.

EPA will approve the Treatability Testing Work Plan or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

3. Treatability Testing QAPP

If the original QAPP is not adequate for defining the activities to be performed during the treatability test, a separate Treatability Testing QAPP, or amendment to the original QAPP for the Site, shall be prepared by Respondents for EPA review and approval, and shall be submitted at the same time as the Treatability Testing Work Plan. EPA will approve the Treatability Testing QAPP or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

4. Treatability Testing HSP

If the original HSP is not adequate for defining the activities to be performed during the treatment tests, a separate or amended HSP shall be developed by Respondents and submitted for EPA review and comment. Section III.N, provides additional information on the requirements of the health and safety plan. EPA does not approve HSPs.

5. Treatability Testing Evaluation Report

Within ninety (90) days after completion of any treatability testing (including field work and receipt of all laboratory results, including validated laboratory results if data validation is required), Respondents shall submit a Treatability Testing Evaluation Report to EPA. The Treatability Testing Evaluation Report shall analyze and interpret the treatability testing results. Depending on the sequences of activities, this report may be a part of the RI/FS Report or a separate deliverable. The report shall evaluate each technology's effectiveness, implementability, cost and actual results as compared with predicted results. The report shall also evaluate full scale application of the technology, including a discussion of the key parameters affecting full-scale operation.

B. EPA will approve the Treatability Testing Evaluation Report or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

X. TASK 9 - BASELINE RISK ASSESSMENT

A. Respondents shall prepare a Baseline Risk Assessment, which shall be incorporated by Respondents into the RI Report, Section XI (Task 10). Respondents shall provide EPA with the following deliverables:

1. Baseline Human Health Risk Assessment ("BHHRA")

Potential current and future cancer risks and non-cancer hazards to human health under current and reasonably anticipated future land uses shall be identified and characterized in accordance with CERCLA, the NCP, and EPA guidance documents including but not limited to the RI/FS Guidance, "Land Use in the CERCLA Remedy Selection Process" (OSWER Directive No. 9355.7-04), "Reuse Assessments: A Tool to Implement the Superfund Land Use Directive" (OSWER 9355.7-04, June 2001), and the definitions and provisions of "Risk Assessment Guidance for Superfund ("RAGS")," Volume 1, "Human Health Evaluation Manual," (December 1989) (EPA/540/1-89/002) and updates (RAGS Parts B, C, D, E, F and Part III available at: http://www.epa.gov/oswer/riskassessment/risk_superfund.htm).

2. Memorandum on Exposure Scenarios and Assumptions ("MESA")

Within sixty (60) days after approval or modification of the RI/FS Work Plan, pursuant to Section IX (Submission and Approval of Deliverables) of the Settlement Agreement, Respondents shall submit a MESA describing the exposure scenarios and assumptions for the BHHRA, taking into account the current and reasonably anticipated future use based on the Site's conditions at the time the Memorandum is prepared. The MESA should include appropriate text describing the conceptual Site model and exposure routes of concern for the Site and include a completed RAGS Part D Table 1. This table shall describe the pathways that will be evaluated in the BHHRA, the rationale for their selection, and a description of those pathways that will not be evaluated and the rationale for excluding these pathways. In addition, the MESA shall include a completed RAGS Part D Table 4 describing the exposure pathway parameters with appropriate references to EPA's 1991 Standard Default Assumptions, the Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (2002) and updates to this guidance developed by the EPA Superfund Program, or, where other, Site-specific exposure assumptions are proposed, a detailed rationale and supporting basis for those assumptions, to be presented for EPA review and approval. In the event that chemicals with a mutagenic mode of action are identified (as described in USEPA 2005a,b and the Handbook for Implementing the Supplemental Cancer Guidance at Waste and Cleanup Sites), specific exposure assumptions for age groups 0 to younger than 16 shall be developed and submitted to EPA for evaluation and approval.

EPA will approve the Memorandum or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

3. Pathway Analysis Report ("PAR")

Respondents shall prepare and submit a PAR within sixty (60) days after Respondents' submission to EPA of the last set of validated data or EPA's approval of the Memorandum on Exposure Scenarios and Assumptions, whichever is later. The PAR shall be developed in accordance with OSWER Directive 9285.7-01D dated January 1998 (or more recent version), entitled, "Risk Assessment Guidelines for Superfund Part D" and other appropriate guidance in Attachment 1 and updated thereto. The PAR shall contain the information necessary for a reviewer to understand how the risks at the Site will be assessed. The PAR shall build on the Memorandum on Exposure Scenarios and Assumptions (see Section X.A.2 above) describing the risk assessment process and how the risk assessment will be prepared. The PAR shall include completed RAGS Part D Tables 2, 3, 5, and 6 as described below. EPA will approve the PAR or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement. The PAR must be reviewed and approved by EPA prior to the submission of the BHHRA. The following information shall be included in the PAR:

a. *Chemicals of Potential Concern ("COPCs")*. The PAR shall contain all the information necessary for a reviewer to understand how the risks at the Site will be evaluated. Based on the validated analytical data, Respondents shall list the hazardous substances present in all sampled media (e.g., soils, sediment, etc.), and the COPCs as described in RAGS Part A.

b. *Table 2 - Selection of COPCs*. COPCs for the Site and associated concentrations in sample media for the PAR shall be determined utilizing all currently available media-specific validated analytical data generated during the RI/FS. The selection of COPCs shall follow RAGS Part A; and before hazardous substances are eliminated as COPCs, they shall be evaluated against the applicable tap water, residential and industrial screening levels in accordance with the current version of the "Regional Screening Levels for Chemical Contaminants at Superfund Sites" screening level/preliminary remediation goal website (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm). The industrial screening level shall not be used as a basis for eliminating any hazardous substance as a COPC. In addition, background shall not be used as a basis to exclude COPCs. The COPCs shall be presented in completed RAGS Part Table 2 format.

c. *Table 3 - Media Specific Exposure Point Concentrations*. Using the COPCs selected in Table 2, this Table shall summarize the Exposure Point Concentrations ("EPCs") for all COPCs for the various media at the Site. The calculation of the EPC shall follow the Supplemental Guidance to RAGS: Calculating the Concentration Term (1992), using EPA's ProUCL 5.1.002 Software or later versions, which evaluates the distribution of the data using Shapiro-Wilk's and Lilliefor's tests, in accordance with the 2015 ProUCL Version 5.1 User Guide and provides recommendations for EPCs, unless Respondents have previously proposed and EPA has approved use of another statistical technique for calculating the 95% Upper Confidence Limit ("UCL") on the mean of the data. In those cases where the 95% UCL exceeds the maximum, the maximum concentration shall be used as the EPC.

d. *Tables 5 and 6 - Toxicological Information*. The Respondents shall provide the toxicological data (e.g., Cancer Slope Factors, Inhalation Unit Risk Factors, Reference Doses, Reference Concentrations, Weight of Evidence Classifications for Carcinogens, and adjusted dermal toxicological factors where appropriate) for the COPCs. Chemicals with a mutagenic mode of action need to be identified in Tables 5 and 6 consistent with the EPA Cancer Guidelines (USEPA, 2005a), Supplemental Guidance for Assessing Susceptibility from Early Life Exposure to Carcinogens (USEPA, 2005b), and Handbook for Implementing the Supplemental Cancer Guidance at Waste and Cleanup Sites. The toxicological data shall be presented in completed RAGS Part D Tables 5 and 6. The sources of data in order of priority, based on the 2003 OSWER Directive 9285.7-53, are:

   i. Tier 1 – Integrated Risk Information System ("IRIS") database (EPA, 2007).

   ii. Tier 2 – Provisional Peer Reviewed Toxicity Values ("PPRTV") – The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center ("STSC") develops PPRTVs on a chemical specific basis when requested by EPA's Superfund program. Provisional values shall either be obtained from the PPRTV webpage available at: http://hhpprtv.ornl.gov/, the "Regional Screening Levels for Chemical Contaminants at Superfund Sites," or from Region 2.

   iii. Tier 3 – Other Toxicity Values – Tier 3 includes additional EPA and non-EPA sources of toxicity information. Priority shall be given to those sources of information that are the most current,

the basis for which is transparent and publicly available, and which have been peer reviewed. Tier 3 values include toxicity values obtained from the California Environmental Protection Agency ("Cal EPA") available at: http://www.oehha.ca.gov/risk/chemicalDB/index.asp., Agency for Toxic Substances and Disease Registry's ("ATSDR's") Minimum Risk Levels ("MRLs"), and toxicity values obtained from the HEAST (EPA 1997b).

To facilitate a timely completion of the PAR, Respondents shall submit a list of chemicals for which IRIS values are not available to EPA as soon as identified thus allowing EPA to facilitate obtaining this information from EPA's National Center for Environmental Assessment.

4. Baseline Human Health Risk Assessment Reporting

Within ninety (90) days after EPA's approval of the PAR, Respondents shall submit to EPA a Baseline Human Health Risk Assessment ("BHHRA") for inclusion in the RI. The submittal shall include completed RAGS Part D Tables 7 through 10 summarizing the calculated cancer risks and non-cancer hazards and appropriate text in the risk characterization with a discussion of uncertainties and critical assumptions (e.g., background concentrations and conditions). Respondents shall perform the BHHRA in accordance with the approach and parameters described in the Memorandum of Exposure Scenarios and Assumptions and the PAR, as described above, including a discussion of uncertainties and other qualifications (if any). Text and tables from these reports previously reviewed by EPA shall be included in the appropriate sections of the BHHRA.

EPA will approve the BHHRA or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement. Upon approval by EPA, the BHHRA shall be incorporated into the RI Report.

B. Within one hundred twenty (120) days after Respondents' submission to EPA of the last set of final validated analytical data, or at such other time as is specified or agreed to by EPA, Respondents shall submit a Screening Level Ecological Risk Assessment ("SLERA") in accordance with current Superfund ecological risk assessment guidance (Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments ("ERAGS"), USEPA, 1997 [EPA/540-R-97-006], OSWER Directive 9285.7-25, June 1997)). The SLERA shall include a comparison of the 95% UCL and maximum contaminant concentrations in each medium of concern for the Site to appropriate conservative ecotoxicity screening values for such medium (if any) and should use conservative exposure estimates for the ecological receptors, considering Site-specific conditions. The SLERA shall also include a recommendation as to whether the conduct of a full Baseline Ecological

Assessment should be considered by EPA. EPA will approve the SLERA or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

C. If EPA determines that a full Baseline Ecological Risk Assessment ("BERA") is required, and so notifies Respondents in writing, Respondents shall, within sixty (60) days thereafter, submit a Scope of Work outlining the steps and data necessary to perform the BERA, including any amendments to the Phase 2 RI/FS Work Plan required to collect additional relevant data. The BERA Scope of Work shall identify any Phase 2 RI/FS Work Plan amendments or addenda, including establishment of a schedule for review and approval of additional field work, subject to EPA approval pursuant to Section IX (Submission and Approval of Deliverables) of the Settlement Agreement. EPA will approve the BERA Scope of Work or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

D. Respondents shall notify EPA in writing within seven (7) days after completion of all field activities associated with the BERA, as identified in the BERA Scope of Work and performed under the approved Phase 2 RI/FS Work Plan addenda. Within one hundred twenty (120) days after submission to EPA of the final set of BERA-related validated data, Respondents shall submit a BERA Report to EPA for inclusion in the RI Report. Actual and potential ecological risks shall be identified and characterized in accordance with CERCLA, the NCP, and EPA guidance including, but not limited to, "Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments," (1997) (EPA/540-R-97-006), ERAGS, dated June 5, 1997 (or most recent guidance). Respondents shall evaluate and assess the risk to the environment posed by contaminants. As part of this subtask, Respondents shall perform the following activities:

1. If required by EPA, Respondents shall prepare a BERA Report that addresses the following:

    a. *Hazard Identification (sources*) - Respondents shall review available information on the hazardous substances present at the Site and identify the major contaminants of concern.

    b. *Dose-Response Assessment* - Respondents shall identify and select contaminants of concern based on their intrinsic toxicological properties.

    c. *Characterization of Site and Potential Receptors* - Respondents shall identify and characterize environmental exposure pathways and the assessment endpoints, and develop an integrated ecological conceptual model. The conceptual model shall include a contaminant fate-and-

transport diagram that traces the contaminants' movement from sources through the ecosystem to receptors that include the assessment endpoints.

d. *Select Chemicals, Indicator Species, and Endpoints* - In preparing the assessment, Respondents shall select representative chemicals and indicator species (species which are especially sensitive to environmental contaminants) to represent the assessment endpoints and measurement endpoints on which to concentrate.

e. *Exposure Assessment* - The exposure assessment shall identify the magnitude of actual or potential environmental exposures, the frequency and duration of these exposures, and the routes by which receptors are exposed, considering the results of any field studies conducted to measure exposures to ecological receptors. The exposure assessment shall include an evaluation of the likelihood of such exposures occurring and shall provide the basis for the development of acceptable exposure levels. In developing the exposure assessment, Respondents shall develop reasonable maximum estimates of exposure for both current land use conditions and reasonably anticipated future land use conditions as they pertain to ecological habitats at the Site.

f. *Toxicity Assessment/Ecological Effects Assessment* - The toxicity and ecological effects assessment shall address the types of adverse environmental effects on survival, growth, and reproduction associated with chemical exposures, the relationships between magnitude of exposures and adverse effects, and the related uncertainties for contaminant toxicity. If field studies are conducted to assess such effects on ecological receptors, the toxicity and ecological effects assessment shall include an evaluation of whether those studies showed adverse effects on survival, growth, or reproduction attributable to the contaminants studied and at what levels, as well as the uncertainties in the study results.

g. *Risk Characterization* - During risk characterization, chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment (which may include Site-specific field studies) shall be compared to measured levels of contaminant exposure and/or the levels predicted through environmental fate and transport modeling. Alternatively, if Site-specific field studies are conducted to assess potential ecological risks, the results of those studies shall be evaluated to characterize the risks to the ecological receptors studied. Consistent with EPA guidance (e.g., "Ecological Risk Assessment and Risk Management Principles for Superfund Sites,"

OSWER Directive 9285.7-28P, October 1999), the risk characterization shall focus on potential Site-specific risks to local populations and communities of biological receptors. These evaluations shall determine whether concentrations of contaminants at or released from the Site, are affecting or could potentially affect the environment.

h. *Identification of Limitations/Uncertainties* - Respondents shall identify critical assumptions (e.g., background concentrations and conditions) and uncertainties in the report.

i. *Conceptual Site Model* - Based on contaminant identification, exposure assessment, toxicity assessment, and risk characterization, Respondents shall revise the preliminary CSM discussed in Section II.A.2 of this SOW, as appropriate.

C. EPA will approve the BERA Report or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

D. Respondents shall submit a Baseline Risk Assessment Report within sixty (60) days of receiving EPA review comments, or approval, of the BHHRA Report, the SLERA Report, and (if required) the BERA Report.

XI. TASK 10 - REMEDIAL INVESTIGATION REPORT

A. Within ninety (90) days after EPA approval of the BHHRA Report, the SLERA Report, or the BERA Report (if required), whichever is latest, Respondents shall prepare and submit an RI Report that accurately establishes the Site characteristics, including but not limited to identification of the contaminated media, and the potential for the contamination to migrate further, the degree to which contaminant degradation is occurring, and the physical boundaries of the contamination. This report shall summarize the results of field activities, sources of contamination, and the fate and transport of contaminants. Pursuant to this objective, Respondents shall obtain only the minimum essential amount of detailed data necessary to determine the key contaminants movement and extent of contamination. The key contaminants shall be selected based on persistence and mobility in the environment and the degree of hazard. Respondents shall use existing standards and guidelines such as drinking water standards, water quality criteria and other criteria accepted by EPA as appropriate for the situation. The RI Report shall incorporate information presented in the approved SCSR including all addenda, the BHHRA Report, the SLERA Report, and, if required, the BERA Report.

B. The RI Report shall be written in accordance with the "Guidance for Conducting Remedial Investigations/Feasibility Studies under CERCLA," OSWER Directive 9355.3-01, October 1988, Interim Final (or latest revision) and "Guidance for Data

Usability in Risk Assessment," (EPA/540/G-90/008), September 1990 (or latest revision). Respondents shall refer to the RI/FS Guidance for an outline of the report format and contents.

C. EPA will approve the RI Report or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

XII. TASK 11 – FEASIBILITY STUDY: DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

A. Concurrently with the site characterization work described in Sections V, VI and VII (Tasks 4, 5 and 6 of this SOW), Respondents shall begin to develop and evaluate remedial action objectives for Site that at a minimum ensure protection of human health and the environment. The development and screening of remedial alternatives shall identify and develop an appropriate range of general response actions. This range of alternatives shall include the following: (1) options in which treatment is used to reduce the toxicity, mobility, or volume of wastes, including, at a minimum, the principal threats posed by the Site, but that vary in the types of treatment, the amount treated, and the manner in which long-term residuals or untreated wastes are managed; (2) options involving containment with little or no treatment; (3) options involving both treatment and containment; (4) options that remove or destroy waste; (5) innovative technologies to the extent practicable; and (6) a no-action alternative. Respondents shall discuss the results of Items 1 and 2 below during Technical Meeting-4 with EPA within sixty (60) days of EPA's approval of the RI Report and prior to proceeding further with the FS. The following activities shall be performed as a function of the development and screening of remedial alternatives.

1. Development of RAOs and General Response Actions

    a. *Develop Remedial Action Objectives* - Respondents shall develop remedial action objectives, which are medium-specific goals for protecting human health or the environment that specify the chemicals of concern ("COCs"), exposure route(s) and receptor(s) and preliminary remediation goals ("PRGs").

    b. *Develop General Response Actions* - Respondents shall develop general response actions for each medium of interest defining containment, treatment, excavation, pumping, or other actions, singly or in combination to satisfy the remedial action objective.

2. Identify Areas or Volumes of Media

    Respondents shall identify areas or volumes of media to which general response actions may apply, taking into account requirements for protectiveness as identified

in the remedial action objectives. The chemical and physical characterization of the Site shall also be taken into account.

3. Assemble and Document Alternatives

Respondents shall assemble selected representative technologies into a list of alternatives for each affected medium or operable unit.

All the alternatives shall represent a range of treatment, removal, and containment combinations that will address the releases at the Site. A summary of the assembled alternatives and their related action-specific ARARs shall be prepared by Respondents for inclusion in the Development and Screening of Remedial Alternatives Technical Memorandum.

The reasons for eliminating alternatives during the preliminary screening process must be specified.

4. Refine Alternatives

Respondents shall refine the remedial alternatives to identify contaminant volume addressed by the proposed process and sizing of critical unit operations as necessary. Enough information shall be collected for an adequate comparison of alternatives. PRGs for each chemical in each medium shall also be modified as necessary to incorporate any new risk assessment information presented in the baseline risk assessment report. Additionally, action-specific ARARs shall be updated as the remedial alternatives are refined.

6. Conduct and Document Screening Evaluation of Each Alternative

Respondents may perform a final screening process based on short- and long-term aspects of effectiveness, implementability, and relative cost. Generally, this screening process is only necessary when there are many feasible alternatives available for detailed analysis. If necessary, the screening of alternatives shall be conducted to assure that only the alternatives with the most favorable composite evaluation of all factors are retained for further analysis. As appropriate, the screening shall preserve the range of treatment and containment alternatives that was initially developed. The range of remaining alternatives shall include options that use treatment technologies and permanent solutions to the maximum extent practicable. Respondents shall discuss the findings of Items 3, 4 and 6 above with EPA during Technical Meeting-5, ninety (90) days after Technical Meeting-4 and prior to proceeding with the Detailed Analysis of Alternatives in Paragraph XII.C below.

B. Within sixty (60) days after the later of (a) EPA's approval of the BHHRA Report, the SLERA Report, or (if required) the BERA Report (whichever is latest) or (b) EPA's approval of Respondents' Treatability Testing Evaluation Report(s) (if treatability studies are undertaken), or such longer time as is specified or agreed to by EPA, Respondents shall submit a Development and Screening of Remedial Alternatives Technical Memorandum, summarizing the work performed in, and the results of, each task in Section XII.A above, including an alternatives array summary. The Memorandum shall also summarize the reasoning employed in screening, arraying alternatives that remain after screening, and identifying the action-specific ARARs for the alternatives that remain after screening. The Memorandum shall also provide an explanation for choosing any institutional or engineering controls as part of any remedial alternative, and the level of effort that will be required to secure, maintain, and enforce the control. Within twenty-one (21) days after submission of the Memorandum, Respondents shall make a presentation to EPA identifying the remedial action objectives and summarizing the development and preliminary screening of remedial alternatives. EPA will approve the Memorandum or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

C. The Detailed Analysis of Remedial Alternatives shall be conducted by Respondents and discussed during Technical Meeting-6 with EPA ninety (90) days after Technical Meeting-5. The meeting will provide EPA with the information needed to allow for the selection of a remedy for the Site. This analysis is the final task to be performed by Respondents during the Feasibility Study and will include the following:

1. Detailed Analysis of Alternatives

   Respondents shall conduct a detailed analysis of alternatives, which shall consist of an analysis of each option against a set of nine evaluation criteria as set forth in 40 C.F.R. § 300.430(e)(9)(iii) and a comparative analysis of all options using the same evaluation criteria as a basis for comparison.

2. Apply Nine Criteria and Document Analysis

   Respondents shall apply the nine evaluation criteria to the assembled remedial alternatives to ensure that the selected remedial alternative will be protective of human health and the environment; will be in compliance with, or include a waiver of, ARARs; will be cost-effective; will utilize permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable; and will address the statutory preference for treatment as a principal element. The evaluation criteria are: (1) overall protection of human health and the environment; (2) compliance with ARARs; (3) long-term effectiveness and permanence; (4) reduction of toxicity, mobility, or volume; (5) short-term effectiveness; (6) implementability; (7) cost; (8) State (or support agency) acceptance; and (9) community acceptance.

For each alternative, Respondents shall provide: (1) a description of the alternative that outlines the remedial strategy involved and identifies the key ARARs associated with each alternative, and (2) a discussion of the individual criterion assessment. If Respondents do not have direct input on criteria (8) State (or support agency) acceptance and (9) community acceptance, these criteria will be addressed by EPA.

3. Compare Alternatives Against Each Other and Document the Comparison of Alternatives

Respondents shall perform a comparative analysis between the remedial alternatives. That is, each alternative will be compared against the others using the nine evaluation criteria as a basis of comparison. Identification and selection of the preferred alternative are reserved by EPA. Respondents shall incorporate the results of the comparative analysis in the FS Report.

XIII. TASK 12 – QUARTERLY PROGRESS REPORTS AND MEETINGS

Respondents shall provide a quarterly progress report and participate in meetings with EPA at major milestones in the RI/FS process, as described herein and outlined in the RI Report/FS Work Plan. The quarterly progress reports shall be submitted to EPA by the 15th day of the following month. At a minimum, with respect to the preceding quarter, these progress reports shall (1) describe the actions which have been taken to comply with the Settlement Agreement during that month, (2) include a summary of sampling and tests performed at Site by the Respondents, (3) describe Work planned for the next quarter with schedules relating such Work to the overall project schedule for RI/FS completion, and (4) describe all problems encountered and any anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated problems or delays.

Respondents have included up to six (6), including two optional, technical meetings with EPA to discuss major deliverables and milestones as further described in this SOW and outlined in Attachment 1 to the SOW. The purpose of the technical meetings is to present and discuss technical information to facilitate consensus on the path forward. Ten (10) business days prior to the meeting, Respondents shall send an agenda to EPA and information that will be discussed in the meeting. The meetings may be postponed, combined with other milestone meetings or canceled if agreed upon by Respondents and EPA. At EPA's request, Respondents shall consider supplemental meetings or phone calls with EPA as warranted.

XIV. TASK 13 – FEASIBILITY STUDY REPORT

A. Respondents shall prepare an FS Report consisting of a detailed analysis of the several remedial alternatives, in accordance with the NCP as well as the most recent guidance. Within (90) days after EPA's approval of the Development and Screening of Remedial Alternatives Technical Memorandum or the final RI Report, or the Baseline Risk Assessment Report, whichever is later (and accounting for schedule for Technical Meetings 4, 5, and 6 in Task 11), Respondents shall submit to EPA an FS Report which reflects the findings in the approved Baseline Risk Assessment. Respondents shall refer to the RI/FS Work Plan, RI/FS Addendum, and the RI/FS Guidance and this SOW for report content and format. Within fourteen (14) days after submission of the FS Report, Respondents shall make a presentation to EPA and the State at which Respondents shall summarize the findings of the FS Report and discuss EPA's preliminary comments and concerns, if any, associated with the FS Report.

B. The FS report shall include the following:

1. Summary of Feasibility Study objectives;

2. Summary of remedial action objectives;

3. Articulation of general response actions;

4. Identification and screening of remedial technologies;

5. Descriptions of remedial alternatives;

6. Detailed analysis of remedial alternatives; and

7. Summary and conclusion.

C. Respondents' technical feasibility considerations shall include the careful study of any problems that may prevent a remedial alternative from mitigating Site problems. Therefore, the Site characteristics from the RI must be kept in mind as the technical feasibility of the alternative is studied. Specific items to be addressed are reliability (operation over time), safety, operation and maintenance, ease with which the alternative can be implemented, and time needed for implementation.

D. EPA will approve the FS Report or otherwise respond in accordance with Section IX (Submission and Approval of Deliverables) of the Settlement Agreement.

Supplemental Signature Page for Administrative Settlement Agreement and Order on Consent for Remedial Investigation and Feasibility Study Regarding the PROTECO Superfund Site
Index Number: CERCLA-02-2020-2010

FOR U.S. ENVIRONMENTAL PROTECTION AGENCY:

10/21/2020
Dated

Evangelista, Pat
Digitally signed by Evangelista, Pat
Date: 2020.10.21 16:16:48 -04'00'

Pat Evangelista, Director
Superfund and Emergency Management Division, Region 2

Supplemental Signature Page for Administrative Settlement Agreement and Order on Consent for Remedial Investigation and Feasibility Study Regarding the PROTECO Superfund Site
Index Number: CERCLA-02-2020-2010

FOR Original Respondents:

10/21/20
Dated

David P. Schneider
Principal
Bressler, Amery & Ross, P.C.
325 Columbia Turnpike, Florham Park, NJ 07932

FOR AbbVie Ltd. (on behalf of Abbott Health Products, LLC f/k/a Abbott Chemicals Inc.):

10/21/20
Dated

Taylor Katherine Reynolds
Senior Counsel, Litigation
AbbVie Ltd.
5 Giralda Farms, Madison, New Jersey 07940

AMENDED APPENDIX A

List of Respondents

AbbVie Ltd. (on behalf of Abbott Health Products, LLC f/k/a Abbott Chemicals Inc.)

BASF Agrochemical Products, B.V.

Block Drug Company, Inc.

Checkpoint Caribbean Ltd.

EMD Millipore Corporation

General Electric Company (for itself and on behalf of Caribe GE International of Puerto Rico, Inc., GE Industrial of PR LLC, and GEA Caribbean Export LLC)

Henkel Puerto Rico, Inc.

HP Inc.

Puerto Rico Electric Power Authority

Roche Products, Inc.

ATTACHMENT B

AUGUST 15, 2014 TITLE STUDY AND OCTOBER 11, 1996 PURCHASE AGREEMENT

CERTIFICO: Que en el mismo día, mes y año de su otorgamiento expedí primera copia certificada de la presente escritura a solicitud de Don Lucas Pérez Valdivieso Torruella, parte interesada. DOY FE.--

Notario Público

----------NUMERO: VEINTINUEVE----------

----------COMPRAVENTA----------

-----En la ciudad de Peñuelas, Puerto Rico, a los--once (11)---------- días del mes de octubre-------de mil novecientos noventa y seis (1996)----------

----------ANTE MI----------

-----ROSA CARABALLO RODRIGUEZ, Abogada y Notario---Público de esta Isla, con residencia y vecindad en-Ponce, Puerto Rico y estudio abierto en la ciudad--de Peñuelas, Puerto Rico.----------

----------COMPARECE----------

-----DE LA PRIMERA PARTE: COMPAÑIA GANADERA DEL----SUR, INC., una corporación debidamente organizada y funcionando al amparo de las Leyes del Estado Libre Asociado de Puerto Rico, representada en este acto por su Vice-Presidente, DON JORGE LUCAS PEREZ------VALDIVIESO TORRUELLA, también conocido como JORGE--LUCAS P. VALDIVIESO JR., Seguro Social número 581--46-1442, mayor de edad, soltero, agricultor y------vecino de Ponce, Puerto Rico, cuyas facultades y---autorización para este acto acredita y acreditará--donde y cuando fuere menester.----------

-----DE LA SEGUNDA PARTE: BROSVAL CHEMICALS, INC., una corporación debidamente organizada y funcionando al amparo de las Leyes del Estado Libre Asociado de Puerto Rico, representada en este acto por su---Presidente, DON LUCAS PEREZ VALDIVIESO TORRUELLA,--Seguro Social número 578-48--7944, mayor de edad,--agricultor y vecino de Ponce, Puerto Rico.---------

----------DOY FE----------

-----De conocer personalmente a los comparecientes desde hace alrededor de trece (13) años.----------

---Asímismo por sus dichos, que juzgo ciertos, la--doy también de sus circunstancias personales.------

Notaria da en cuanto a los números de Seguro Social de las corporaciones mediante la escritura # 4 del Protocolo para 1998.

---Me aseguran tener, y a mi juicio tienen, la-----
capacidad legal necesaria para este otorgamiento, y
en tal virtud libre y voluntariamente,----------

----------EXPONEN----------

-----PRIMERO: La compareciente de la Primera------
Parte es dueña en pleno dominio de la propiedad----
que se describe a continuación:----------

-------"RUSTICA: Predio de terreno ubicado en el--
Barrio Tallaboa Saliente, jurisdicción del pueblo--
de Peñuelas, Puerto Rico, con un área superficial--
de CUARENTA Y DOS (42) CUERDAS, equivalentes a-----
Diceiseis (16) hectáreas, Cincuenta (50) áreas,----
Setenta y Seis (76) centiáreas u Treinta y ocho----
(38) miliáreas, integrada por dos cuerpos que se---
describen así:----------
---PARCELA A: Predio de terreno ubicado en el-----
Barrio Tallaboa Saliente, término municipal de-----
Peñuelas, Puerto Rico, dedicado a pastos y malezas,
con un área superficial de NUEVE (9) CUERDAS,------
equivalentes a Tres (3) hectáreas, Cincuenta y tres
(53) áreas, Setenta y Tres (73) centiáreas, y-----
Cincuenta y una (51) miliáreas. En lindes por el--
NORTE con la Parcela B de la Compañía Ganadera del
Sur, Inc.; por el SUR con los hermanos Lucas y-----
Jorge Lucas Pérez Valdivieso Torruella; por el ESTE
con los hermanos Lucas y Jorge Lucas Pérez---------
Valdivieso Torruella; y por el OESTE, con----------
Environment Preservation Associates Corporation y--
los hermanos Lucas y Jorge Lucas Pérez Valdivieso--
Torruella.----------
---PARCELA B: Predio de terreno ubicado en el-----
Barrio Tallaboa Saliente, término municipal de-----
Peñuelas, Puerto Rico, dedicado al manejo y dispo--
sición de desperdicios, con un área superficial de-
TREINTA Y TRES (33) CUERDAS, equivalentes a Ciento
Veintinueve Mil Setecientos Dos Punto Ochenta y----
Siete Metros Cuadrados (129,702.87 m/c), equivalen-
tes a doce (12) hectáreas, noventa y siete (97)----
áreas, dos (02) centiáreas, y ochenta y siete (87)-
miliáreas. En lindes por el NORTE con terrenos de-
los hermanos Lucas y Jorge Lucas Pérez Valdivieso--
Torruella y Luis Sala; por el SUR con la Parcela A
de la Compañía Ganadera del Sur, Inc.; por el ESTE
con los hermanos Lucas y Jorge Lucas Pérez---------
Valdivieso Torruella y Luis Sala; y por el OESTE,--
con los hermanos Lucas y Jorge Lucas Pérez---------
Valdivieso Torruella."----------

------Dicha propiedad se halla inscrita al Folio 49
vuelto del Tomo 84 de Peñuelas, Finca 2202, al-----
margen de la inscripción número 8.----------

-----SEGUNDO: Que los comparecientes han convenido
en la compraventa de la propiedad antes descrita y-
la llevan a efecto sujeto a las siguientes:--------

----------CLAUSULAS Y CONDICIONES----------

-----PRIMERA: La compareciente de la Primera Parte por la presente VENDE, CEDE Y TRASPASA a favor de-- la compareciente de la Segunda Parte, y ésta------ COMPRA, ADQUIERE Y ACEPTA la propiedad antes------- descrita con todos sus usos, derechos y todo cuanto le sea anejo y le pertenezca.----------

-----SEGUNDA: Se verifica esta compraventa por el- convenido y ajustado precio de SEIS MIL TRESCIENTOS DOLARES ($6,300.00), cuya suma recibe la Vendedora en este mismo acto, a entera satisfacción, y por--- cuya suma y por este medio otorga La Vendedora a--- favor de la Compradora el más formal y eficaz------ recibo.----------

-----TERCERA: La compradora podrá entrar en la---- posesión de la propiedad que adquiere sin más for-- malidad que el presente otorgamiento.----------

-----CUARTA: La Vendedora se obliga a favor de la Compradora al saneamiento por razón de evicción---- conforme a derecho.----------

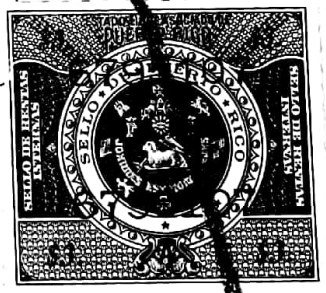
----------ACEPTACION----------

-----Los comparecientes aceptan la presente-------- escritura por ser y hallarla conforme a lo por----- ellos convenido, procediendo yo, la Notario, a----- hacerles las advertencias legales pertinentes.-----

--Así lo dicen y otorgan ante mí, la Notario, lue- go de haber renunciado al derecho que les advertí-- tenían para requerir la presencia de testigos------ instrumentales.----------

---Leída íntegramente la presente escritura por los comparecientes en uso de su derecho a así hacerlo-- del que yo, la Notario, les advertí, se ratifican-- en su contenido y la firman, escribiendo además en- todos y cada uno de sus folios las iniciales de sus respectivos nombres y apellidos, todo ello en mi---

presencia. De todo lo cual y del total contenido-- de esta escritura, yo, la Notario, firmo, signo,--- rubrico, sello y DOY FE.----------



Propiedad Asignada 339-000-007-34-852 Número de Catastro

OFICINA DE INVESTIGACIONES DE TÍTULOS

NILDA RODRÍGUEZ TORRES
INVESTIGADORA DE TÍTULOS
ESTRELLA 58
PO BOX 331443
PONCE, PR 00733-1443
TELÉFONO
787-842-2015

Terreno contaminado sin uso

RE: BROSVAL CHEMICAL, INC. 42.0 cdas

DESCRIPCION:

RUSTICA: Predio de terreno con un área superficial de CUARENTA Y DOS CUERDAS, equivalentes a diez y seis hectáreas, cincuenta áreas, setenta y seis centiáreas y treinta y ocho miliáreas, integrada por dos cuerpos que se describen así:

PARCELA 'A': RUSTICA: Predio de terreno dedicado a pastos y malezas con un área superficial de NUEVE CUERDAS, equivalentes a tres hectáreas, cincuenta y tres áreas, setenta y tres centiáreas y cincuenta y una miliáreas. En lindes por el NORTE, con la Parcela B de la Compañía Ganadera del Sur, Inc.; por el SUR, con los hermanos Lucas y Jorge Lucas Pérez Valdivieso Torruella; por el ESTE, con los hermanos Lucas y Jorge Lucas Pérez Valdivieso Torruella y por el OESTE, con Environment Preservation Associates Corporation y los hermanos Lucas y Jorge Lucas Pérez Valdivieso Torruella.

PARCELA 'B' RUSTICA: Predio de terreno radicado en el Barrio Tallaboa Saliente del término municipal de PEÑUELAS y dedicado al manejo y disposición de desperdicios, con un área superficial de TREINTA Y TRES PUNTO CERO CERO CUERDAS, equivalentes a CIENTO VEINTI-NUEVE MIL SETECIENTOS DOS PUNTO OCHENTA Y SIETE METROS CUADRADOS, equivalentes a doce hectáreas, noventa y siete áreas, dos centiáreas y ochenta y siete miliáreas. En lindes por el NORTE, con terrenos de los hermanos Lucas y Jorge Lucas Pérez Valdivieso Torruella y Luis Sala; por el SUR, con la parcela A de la Compañía Ganadera del Sur, Inc.; por el ESTE, con los hermanos Lucas y Jorge Lucas Pérez Valdivieso Torruella y Luis Sala; por el OESTE, con los hermanos Lucas y Jorge Lucas Pérez Valdivieso Torruella.

ADQUISICION:

✓INSCRITA al folio 44 del tomo 198 de Peñuelas, finca número 2,202, inscripción 13a., favor de Brosval Chemical, Inc., una Corporación debidamente organizada y funcionando al amparo de las Leyes del Estado Libre Asociado de Puerto Rico, por compra a Compañía Ganadera del Sur precio de $6,300.00, por la escritura número 29, otorgada en Peñuelas, el 11 de octubre de 1996, ante la Notario Rosa Caraballo Rodríguez.

CARGAS:

1. POR SU PROCEDENCIA: está afecta a servidumbre de paso a favor de la finca de Luis Díaz Velázquez y servidumbre a favor del Estado Libre Asociado de Puerto Rico.

(CONTINÚA)

RE: BROSVAL CHEMICAL, INC.
FINCA NÚMERO 2,202

POR SI:

2. Anotación Preventiva sobre Prohibición de enajenar, seguido en el Tribunal de Primera Instancia, Sala Superior de Puerto Rico, en el Caso número JAC-2001-1052 (604) sobre Fraude, Daños y Perjuicios, Incumplimiento de Contrato, con fecha 20 de febrero de 2002, seguido por Resources Management, Inc. h/n/c Proteco, R.M. Holding, Inc. Jorge J. Faz Pabón, Liza V. Fernández Pabón, Karen P. Fernández Rosselli, Thomas M. Garity e Ivelisse Estrada Rivero, demandantes, contra Compañía Ganadera del Sur, Inc., Brosval Chemical, Inc., Environmental Preservation Associates Corporation, Corporación Agrícola Peñolana, Inc., Tallaboa Industrial Development, Inc., demandados.

Anotado al folio 13, tomo 223 de Peñuelas, finca número 2,202, Anotación A, con fecha 30 de diciembre de 2002.

EMBARGOS POR CONTRIBUCIONES ESTATALES: NINGUNOS.

GRAVAMENES A FAVOR DE E.U.A: NINGUNOS.

REGISTRO DE SENTENCIAS O DE INCAPACITADOS: NADA.

DOCUMENTOS PENDIENTES DE DESPACHO: NINGUNOS.

Ponce, Puerto Rico, a 15 de agosto de 2014.
HORA: 8:00 A.M.
BITACORA ELECTRONICA.

NILDA RODRIGUEZ TORRES
INVESTIGADORA DE TITULOS

NRT

ATTACHMENT C
HISTORICAL AERIAL PHOTOGRAPHS

Aerial Source:
1977 U.S. Geological Survey, Acquisition Date: 1977/03/28 , ARH770100100659 : U.S. Geological Survey

N

0 200 Feet

1977 Historical Aerial Photograph

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure C-1

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\FigC1_1977_HistAerial.mxd 6/28/2022 10:05:40 AM

Aerial Source:
1983 U.S. Geological Survey, Acquisition Date: 1983/02/08, ARH820580040776: U.S. Geological Survey

N

0 200 Feet

1983 Historical Aerial Photograph

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

Figure C-2

FR3703C | July 2022

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\FigC2_1983_HistAerial.mxd 6/28/2022 10:09:13 AM

Aerial Source:
1993 U.S. Geological Survey, Acquisition Date: 1993/10/17, DI00000000848853: U.S. Geological Survey

N

0 200 Feet

1993 Historical Aerial Photograph

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

Figure C-3

FR3703C | July 2022

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\FigC3_1993_HistAerial.mxd 6/28/2022 10:07:44 AM

Aerial Source:
2010 U.S. Geological Survey, Acquisition Date: 2010/01/31, 2739108_PUERTORICO20100145: U.S. Geological Survey

N

0 200 Feet

2010 Historical Aerial Photograph

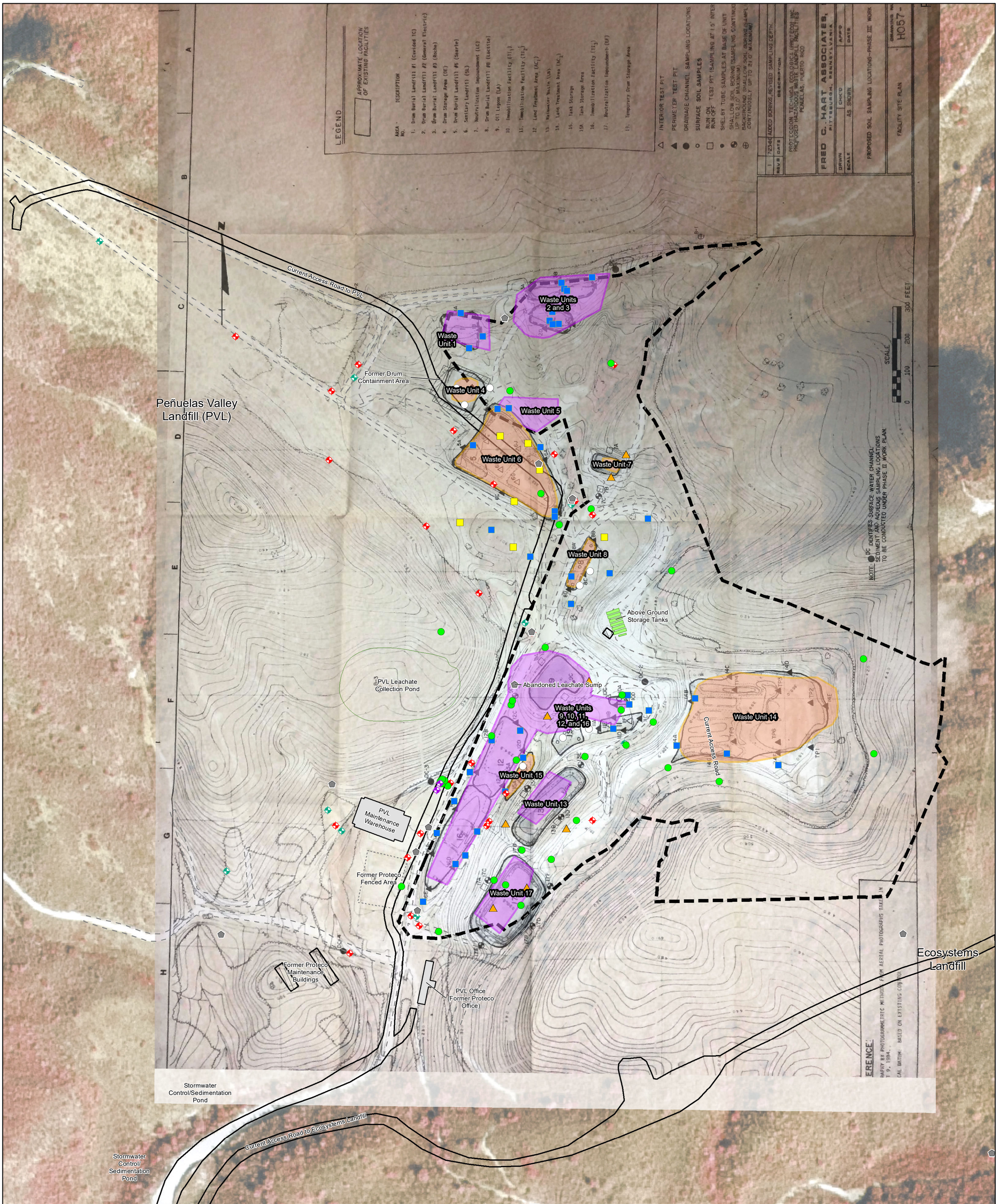
Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure C-4

\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\FigC4_2010_HistAerial.mxd 6/28/2022 10:14:42 AM



Weston GPS Locs (2017-07-20)
Surface Soil Sample
Perimeter Test Pit
Interior Test Pit
Run-On/Run-Off Test Pit
Soil Boring
Monitoring Well (LDWBU)
Monitoring Well (PWBU)
Monitoring Well (RLWBU)
Monitoring Well (SAWBU)
"Old Monitoring Well"
Waste Unit (Source: Deed Metes & Bounds)
Waste Unit
Building
Former Building
Former Containment Area
Former Fence
Leachate Pond
Road/ Trail (1988)
Road/ Trail (2020)
Above Ground Storage Tank
PROTECO - Controlled Fenced Area (Approx.)

NOTES:
1. Map and Aerial Photo Source: Hart Engineers,Inc. Phase III Soil Investigation (1988-02-12) and USGS Aerial Photograph dated 1983-02-08
2. Waste Unit Locations Source: 1999 metes and bounds survey description of capped landfill areas included in the Hazardous Waste Management Unit Post-Closure Care Permit Application (Law Environmental – Caribe, 1999a)

N

0 200 Feet

Geo-referenced Historical Survey Plan and Aerial Photo

Proteco Superfund Site
Peñuelas, Puerto Rico

Geosyntec consultants

FR3703C | July 2022

Figure C-5

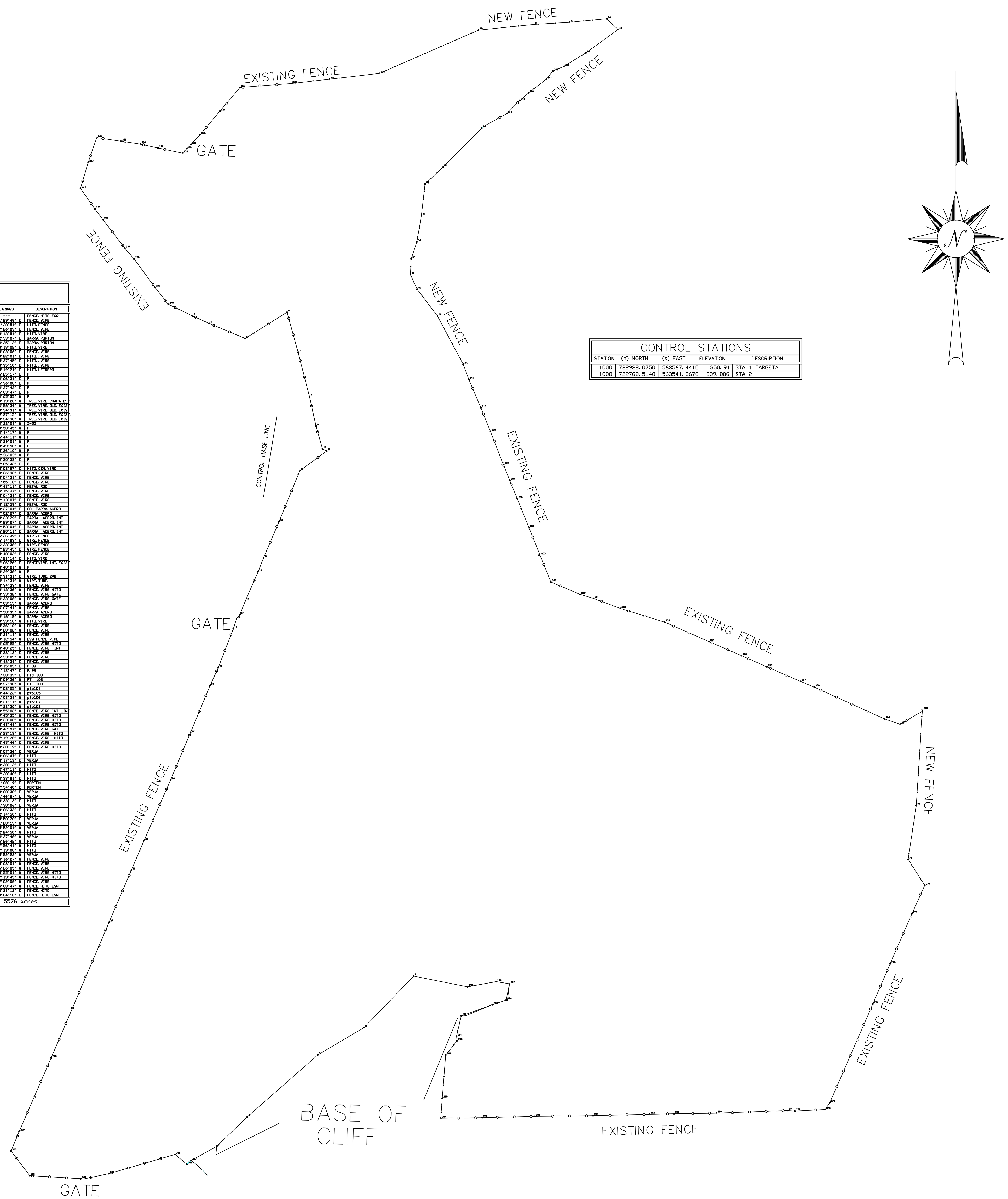
\\columbia-01\data\GIS\FR3707_PROTECO_Superfund_PR\MXD\SPTM_Report_20220426\FigC5_GeorefHist_SurveyPlan_1983Aerial.mxd 6/28/2022 10:14:07 AM

ATTACHMENT D
SITE SURVEY (2022)

SURVEY DATA

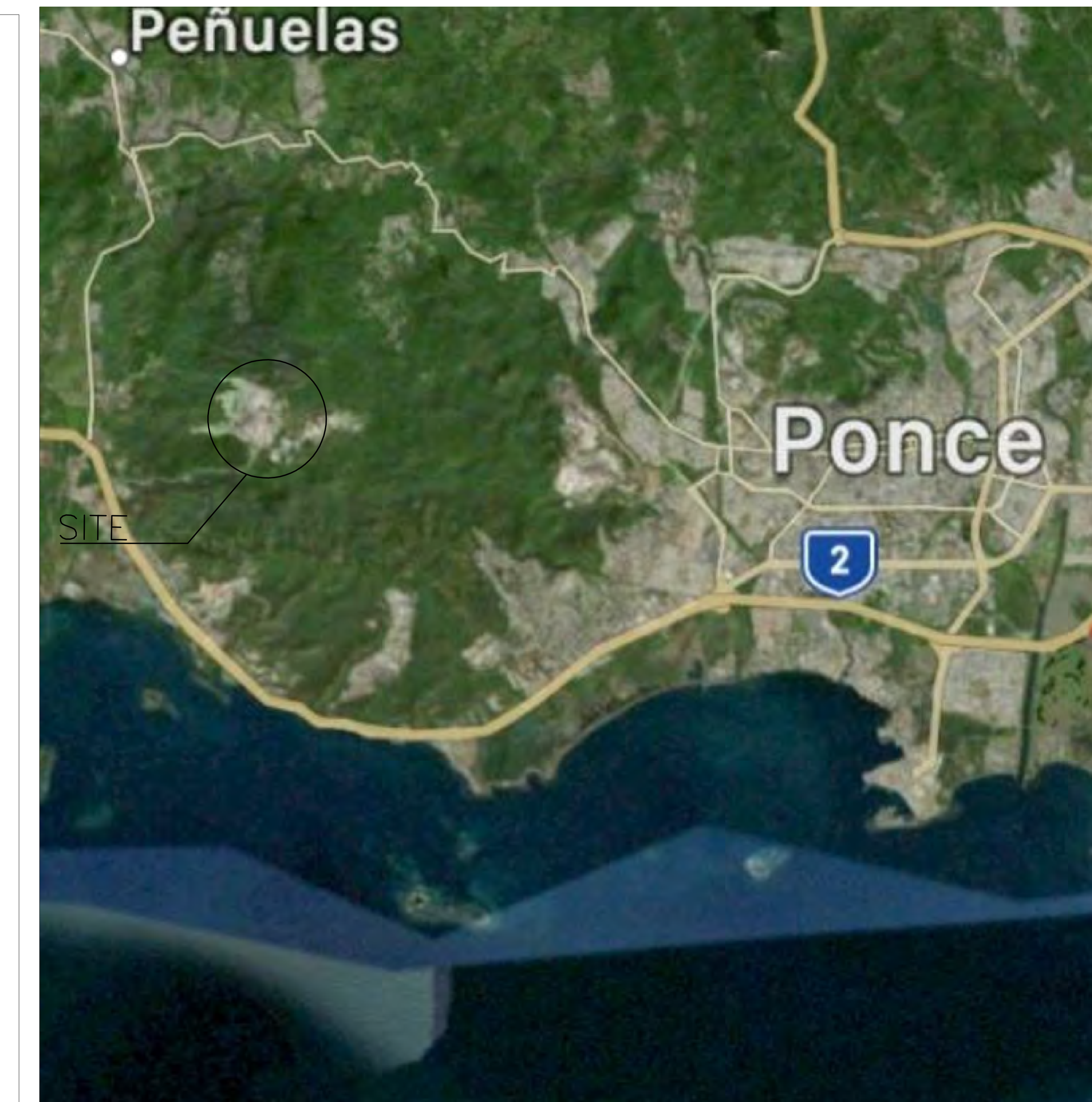
POINT	LINE	(Y) NORTH	(X) EAST	DISTANCE	BEARINGS	DESCRIPTION
232	---	723471.9430	563214.6880	---	---	FENCE. HITO. ESQ
231	232-231	723464.8430	563262.1760	48.02	S 81°29'48" E	FENCE. WIRE
230	231-230	723459.1520	563300.1680	38.42	S 81°28'51" E	HITO. FENCE
229	230-229	723451.4610	563334.6720	35.35	S 77°26'03" E	FENCE. WIRE
228	229-228	723441.4220	563382.8550	49.22	S 78°13'51" E	HITO. WIRE
227	228-227	723450.8430	563391.6050	12.86	N 42°53'07" E	BARRA. PORTON
226	227-226	723458.5780	563399.1850	10.83	N 44°25'13" E	BARRA. PORTON
225	226-225	723477.7710	563417.2720	26.37	N 43°18'02" E	HITO. WIRE
224	225-224	723523.5450	563455.7520	59.80	N 40°03'08" E	FENCE. WIRE
223	224-223	723570.0420	563495.2780	61.03	N 40°22'01" E	HITO. . WIRE
222	223-222	723577.7020	563595.4970	100.51	N 85°37'45" E	HITO. . WIRE
221	222-221	723586.0670	563669.9100	74.88	N 83°35'10" E	HITO. . WIRE
220	221-220	723597.5640	563768.1240	98.88	N 83°19'24" E	HITO. LETRERO
40	220-40	723682.2560	563962.1750	211.73	N 66°25'17" E	P
41	40-41	723693.3670	564069.8690	108.27	N 84°06'34" E	P
42	41-42	723697.5340	564140.0080	70.26	N 86°36'00" E	P
43	42-43	723704.6370	564213.2660	73.60	N 84°27'43" E	P
44	43-44	723683.3740	564235.3330	30.64	S 46°03'47" E	P
45	44-45	723637.8180	564172.4030	77.69	S 54°05'55" W	P
248	45-248	723611.4040	564129.5970	50.30	S 58°19'22" W	TREE. WIRE. CHAPA. 297
249	248-249	723602.0570	564107.6010	23.90	S 66°58'39" W	TREE. WIRE. OLD. EXIST
247	249-247	723586.0700	564094.8500	20.45	S 38°34'31" W	TREE. WIRE. OLD. EXIST
246	247-246	723559.0760	564059.7290	44.30	S 52°27'15" W	TREE. WIRE. OLD. EXIST
245	246-245	723544.7680	564042.9320	22.06	S 49°34'30" W	TREE. WIRE. OLD. EXIST
215	245-215	723519.0850	564017.7950	35.94	S 44°23'04" W	S-50
50	215-50	723490.5890	563968.4800	56.96	S 59°58'45" W	P
51	50-51	723414.2000	563892.7860	107.54	S 44°44'17" W	P
52	51-52	723380.8670	563857.3690	48.64	S 46°44'11" W	P
53	52-53	723319.7560	563850.4240	61.50	S 06°29'01" W	P
54	53-54	723267.6730	563841.3970	52.86	S 09°49'58" W	P
55	54-55	723234.3390	563830.2850	35.14	S 18°26'10" W	P
56	55-56	723203.7840	563828.8970	30.59	S 02°36'03" W	P
57	56-57	723174.9240	563842.0590	31.72	S 24°30'58" E	P
58	57-58	723122.5340	563881.6740	65.68	S 37°05'42" E	P
212	58-212	723028.1230	563932.1710	107.07	S 28°08'27" E	HITO. CEM. WIRE
211	212-211	722998.1170	563943.3560	32.02	S 20°26'36" E	FENCE. WIRE
210	211-210	722942.7920	563966.9260	60.14	S 23°04'31" E	FENCE. WIRE
209	210-209	722896.7960	563985.4360	49.58	S 21°55'16" E	FENCE. WIRE
1002	209-1002	722831.7974	564008.7340	69.05	S 19°43'11" E	METAL ROD
207	1002-207	722801.0820	564023.2270	33.96	S 25°15'37" E	FENCE. WIRE
206	207-206	722764.8790	564037.9100	39.07	S 22°04'34" E	FENCE. WIRE
205	206-205	722708.7110	564060.8530	60.67	S 22°13'07" E	FENCE. WIRE
1003	205-1003	722654.5791	564080.7870	57.69	S 20°12'58" E	METAL ROD
203	1003-203	722602.0340	564103.7630	57.35	S 23°37'04" E	COL. BARRA. ACERO
250	203-250	722577.7090	564161.1670	62.35	S 67°02'07" E	BARRA ACERO
251	250-251	722569.9120	564187.3070	27.28	S 73°23'29" E	BARRA . ACERO. INT
252	251-252	722550.2670	564239.8240	56.07	S 69°29'27" E	BARRA . ACERO. INT
253	252-253	722523.7440	564325.9550	90.12	S 72°53'04" E	BARRA . ACERO. INT
254	253-254	722485.4510	564413.3400	95.41	S 66°20'11" E	BARRA . ACERO. INT
255	254-255	722457.9630	564476.8940	69.24	S 66°36'39" E	WIRE. FENCE
256	255-256	722436.0450	564526.6820	54.40	S 66°14'23" E	WIRE. FENCE
257	256-257	722407.5510	564592.4040	71.63	S 66°33'38" E	WIRE. FENCE
258	257-258	722396.3400	564619.3310	29.17	S 67°23'45" E	WIRE. FENCE
260	258-260	722334.0940	564756.9810	151.07	S 65°40'02" E	FENCE. WIRE
261	260-261	722323.7180	564787.7310	32.45	S 71°21'14" E	HITO. WIRE
278	261-278	722351.8310	564831.1990	51.77	N 57°06'26" E	FENCEWIRE. INT. EXIST
75	278-75	722164.2000	564819.1740	188.02	S 03°40'01" W	P
76	75-76	722059.3390	564803.2020	106.07	S 08°39'38" W	P
277	76-277	722008.3580	564835.7120	60.46	S 32°31'31" E	WIRE. TUBO. 2#2
276	277-276	721952.5840	564810.5970	61.17	S 24°14'31" W	WIRE. TUBO.
275	276-275	721854.8180	564767.9300	106.67	S 23°34'39" W	FENCE. WIRE.
274	275-274	721776.1440	564734.1670	85.61	S 23°13'36" W	FENCE. WIRE. HITO
273	274-273	721583.3170	564650.0880	210.36	S 23°33'32" W	FENCE. WIRE. GATE
272	273-272	721569.6520	564640.6780	16.59	S 34°33'08" W	FENCE. WIRE. GATE
279	272-279	721566.6060	564581.4870	59.27	S 87°03'15" W	BARRA ACERO
271	279-271	721567.5680	564567.2700	14.25	N 86°07'44" W	FENCE. WIRE
280	271-280	721562.3230	564427.9360	139.43	S 87°50'39" W	BARRA ACERO
281	280-281	721561.3140	564344.8560	83.09	S 89°18'15" W	BARRA ACERO
282	281-282	721560.1800	564296.6340	48.24	S 88°39'10" W	HITO. WIRE
283	282-283	721557.4870	564186.2330	110.43	S 88°36'10" W	FENCE. WIRE.
285	283-285	721556.1610	564072.1730	114.07	S 89°20'02" W	FENCE. WIRE
286	285-286	721553.5000	563969.1500	103.06	S 88°31'14" W	FENCE. WIRE
287	286-287	721552.3910	563888.2250	80.93	S 89°12'54" W	ESQ. FENCE WIRE.
288	287-288	721591.7850	563891.0420	39.49	N 04°05'25" E	FENCE. WIRE HITO
289	288-289	721676.1130	563897.9360	84.61	N 04°40'25" E	FENCE. WIRE . INT
290	289-290	721704.0360	563920.1230	35.66	N 38°28'12" E	FENCE. WIRE
291	290-291	721712.8550	563919.1100	8.88	N 06°33'09" W	FENCE. WIRE
292	291-292	721752.6450	563928.1580	40.81	N 12°48'39" E	FENCE. WIRE
293	292-293	721774.5410	563989.1460	64.80	N 70°15'03" E	P. 98
294	293-294	721783.7350	564016.1990	28.57	N 71°13'47" E	P. 99
297	294-297	721815.5440	564022.7540	32.48	N 11°38'39" E	PTS. 100
102	297-102	721820.0250	563996.9190	26.22	N 80°09'36" W	PT. 102
103	102-103	721809.7240	563940.6550	57.20	S 79°37'30" W	PT. 103
1	103-1	721791.5870	563897.6460	46.68	S 67°08'05" W	pto104
2	1-2	721737.3410	563777.2840	132.02	S 65°44'22" W	pto105
3	2-3	721691.5208	563643.7630	141.16	S 71°03'34" W	pto106
4	3-4	721589.5310	563519.9530	160.41	S 50°31'11" W	pto107
5	4-5	721497.6880	563449.7550	115.60	S 37°23'30" W	pto108
307	5-307	721469.7870	563399.5890	57.40	S 60°55'06" W	FENCE. WIRE. INT. LINE
306	307-306	721462.5590	563391.0480	11.19	S 49°45'35" W	FENCE. WIRE. HITO
305	306-305	721481.5900	563367.9190	29.95	N 50°33'06" W	FENCE. WIRE. HITO
304	305-304	721443.9850	563238.3780	134.89	S 73°48'44" W	FENCE. WIRE. HITO
302	304-302	721434.0400	563183.5680	55.70	S 79°42'57" W	FENCE. WIRE. GATE
301	302-301	721440.2140	563083.4340	100.32	N 86°28'18" W	FENCE. WIRE. HITO
300	301-300	721488.2790	563046.7860	60.44	N 37°19'28" W	FENCE. WIRE. HITO
299	300-299	721526.8000	563062.9230	41.76	N 22°43'46" E	FENCE. WIRE.
298	299-298	721670.6510	563125.4870	156.87	N 23°30'19" E	FENCE. WIRE. HITO
27	298-27	721936.2883	563238.9376	288.85	N 23°07'36" E	VERJA
26	27-26	722038.0489	563282.3695	110.64	N 23°06'47" E	HITO
25	26-25	722096.3350	563307.4558	63.46	N 23°17'13" E	VERJA
24	25-24	722215.0496	563359.4120	129.59	N 23°38'13" E	HITO
23	24-23	722307.7530	563398.3551	100.55	N 22°47'11" E	HITO
22	23-22	722399.0457	563436.4439	98.92	N 22°38'48" E	HITO
21	22-21	722434.4300	563452.6112	38.90	N 24°33'21" E	HITO
19	21-19	722510.7075	563482.1032	81.78	N 21°08'19" E	PORTON
18	19-18	722529.5282	563488.1861	19.78	N 17°54'40" E	PORTON
17	18-17	722538.1090	563494.8922	10.89	N 38°00'30" E	VERJA
16	17-16	722565.4475	563505.8125	29.44	N 21°46'27" E	VERJA
15	16-15	722622.6609	563530.7530	62.41	N 23°33'12" E	HITO
14	15-14	722649.1241	563541.1780	28.44	N 21°30'06" E	VERJA
13	14-13	722720.1488	563571.4858	77.22	N 23°06'33" E	HITO
12	13-12	722819.8230	563612.2578	107.69	N 22°14'50" E	HITO
11	12-11	722858.3353	563664.9533	65.27	N 53°50'20" E	VERJA
10	11-10	722862.9111	563656.5361	9.58	N 61°28'13" W	VERJA
9	10-9	722907.2165	563643.9431	46.06	N 15°52'01" W	VERJA
8	9-8	722964.2657	563631.3856	58.41	N 12°24'50" W	HITO
7	8-7	723051.6903	563608.8359	90.29	N 14°27'48" W	VERJA
6	7-6	723130.0875	563587.1753	81.33	N 15°26'42" W	HITO
5	6-5	723078.7643	563505.2175	96.70	S 57°56'41" W	HITO
4	5-4	723108.2103	563434.7673	76.36	N 67°19'00" W	HITO
3	4-3	723122.9379	563401.8846	36.03	N 65°52'23" W	VERJA
240	3-240	723145.5970	563354.8570	52.20	N 64°16'27" W	FENCE. WIRE
239	240-239	723179.0050	563328.6300	42.47	N 38°08'01" W	FENCE. WIRE
238	239-238	723234.4020	563287.7360	68.86	N 36°26'05" W	FENCE. WIRE
237	238-237	723255.3990	563269.5370	27.79	N 40°55'01" W	FENCE. WIRE HITO
236	237-236	723311.1320	563227.0350	70.09	N 37°19'45" W	FENCE. WIRE HITO
235	236-235	723332.1000	563211.2140	26.27	N 37°02'08" W	FENCE. WIRE
234	235-234	723372.2960	563182.9150	49.16	N 35°08'47" W	FENCE. HITO. ESQ
233	234-233	723423.4970	563197.9390	53.36	N 16°21'12" E	FENCE. HITO.
232	233-232	723471.9430	563214.6880	51.26	N 19°04'18" E	FENCE. HITO. ESQ

AREA = 1940927.1889 sq ft. =□= 44.5576 acres.



CONTROL STATIONS

STATION	(Y) NORTH	(X) EAST	ELEVATION	DESCRIPTION
1000	722928.0750	563567.4410	350.91	STA. 1 TARGETA
1000	722768.5140	563541.0670	339.806	STA. 2



NOTES:

1. ALL DISTANCES ARE EXPRESSED IN FEET, UNLESS OTHERWISE NOTED.
2. FIELDWORK PERFORMED ON JANUARY 2022.
3. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULT OF THE SURVEY MADE ON THE DATE INDICATED AND CAN ONLY BE CONSIDERED AS AN INDICATION OF THE CONDITIONS AT THAT TIME .
4. CONTRACTOR SHALL VERIFY ALL FIELD CONDITIONS AND MEASUREMENTS AND ADVISE ARCHITECT OR OWNER OF ANY DIFFERENCES.
5. ALL THE FENCES WERE SHOWN BY THE OWNER.
6. THIS IS NOT A PROPERTY LIMIT STUDY

LEGEND: NOT ALL APPLIED

ESTACIÓN DE CONTROL
EXISTING FENCE
NEW FENCE
CLIFF
POZO DE UTILIDADES ELÉCTRICAS
POZO TELEFÓNICO
POZO DE AGUA
MURO DE RETENCIÓN
ALCANTARILLA
METRO DE AGUA
VÁLVULA DE AGUA
POSTE DE ILUMINACIÓN DE CONCRETO
POSTE ELÉCTRICO DE CONCRETO
POSTE DE UTILIDADES
POSTE DE CABLEADO
POSTES ELÉCTRICO/ TELEFÓNICO DE MADERA
POSTE TELEFÓNICO
POSTE ELÉCTRICO DE MADERA
POSTE DE ILUMINACIÓN DE MADERA

POSTE DE CABLE TV
POSTE DE ILUMINACIÓN DE METAL
POSTE ELÉCTRICO DE METAL
POSTE DE DOBLE ILUMINACIÓN DE METAL
POSTE DE SEMÁFOROS
0.0 KM ID
RESPIRADERO SANITARIO
HIDRANTE DE INCENDIOS
ALCANTARILLADO DE ENCINTADO
CABINA DE TELÉFONO PUBLICO
SLB CAJA DE SEMÁFOROS
RAMPA DE IMPEDIDOS
LETRERO
CABLE GUÍA
ÁRBOLES EXISTENTES
PALMAS EXISTENTES
CAJA DE ACCESO

LÍNEA DE ALCANTARILLADO SANITARIO
LÍNEA DE ALCANTARILLADO PLUVIAL
LÍNEA DE AGUA
LÍNEA DE TELÉFONO
LÍNEA ELÉCTRICA
VERJA ESLABONADA
VERJA DE ALAMBRE DE PÚAS
LÍNEA ELÉCTRICA SOTERRADA
LÍNEA TELEFÓNICA SOTERRADA
VALLA DE SEGURIDAD
60.00 PUNTO DE ELEVACIÓN
ELEVACIÓN DE CONTORNO CADA 1.00 METRO
EDIFICIO EXISTENTES
POSTE ELECTRICO

TE= ELEVACION DE TOPE
MHS= MANHOLE SANITARIO
MHP= MANHOLE PLUVIAL
IE= ELEVACION DE INVERTIDA

RIGHT WAY ENVIROMENTAL CONSTRUCTORS, INC.
HC-72 Box 3744 NARANJITO PURTO RICO 00719

REVISIONS

SYM.	DESCRIPTIONS	BY:	DATE:

PROJECT NAME: DRAFT

SHEET TITLE: PERIMETER PROTECO-DRAFT

CERTIFICATION:
I CERTIFY CORRECT

RICHARD CHANG
SURVEYOR LIC. #15582

DRAWN BY: A.MALDONADO
DATE: 28/2/2022
SCALE: 3"=1'
DESIGNED BY: DESIGN_BY
APPROVED BY: RCHANG
DRAWING NUMBER:
SHEET NO. 1 OF 1

ATTACHMENT E

PHOTOGRAPHS OF ACCESS CONTROL FEATURES

Figure 1. Signs installed near the northwest corner of Site in April 2021. Viewed towards the southeast.

Figure 2. View towards the east of signs installed in April 2021 and access control gate installed in January of 2022 on west central area of Site.

Photo 3. Signs installed at southwest corner of Site near the Penuelas Valley Landfill office in April of 2021. Viewed towards the north.

(a)

(b)

Figure 4. Access barrier (a) and signs (b) installed in April 2021 at the southeast access gate to the Ecosystems Facility. Viewed towards the southeast.

Photo 5. View of a section of repaired barbed-wire fence line along the southeast Site boundary. View towards the east.

Photo 6. View of a section of repaired barbed-wire fence line along the northeast Site boundary. View towards the south.